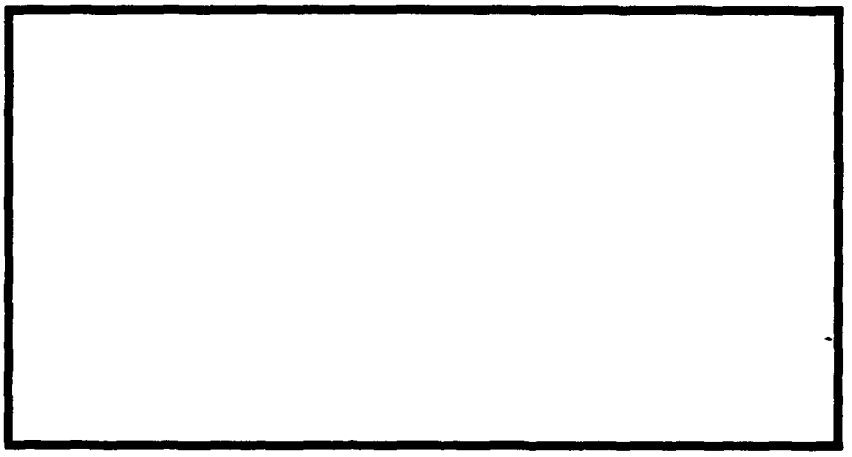


DEPARTMENT OF THE AIR FORCE

AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GIR/LSR/91D-1

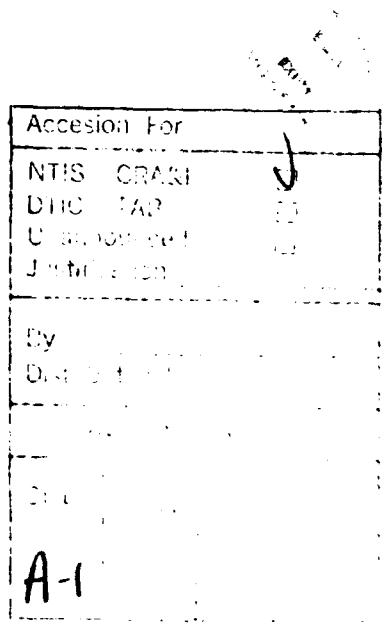
A DELPHI FORECAST OF 1996 ROLES: AIR FORCE INSTITUTE OF TECHNOLOGY INFORMATION RESOURCE MANAGEMENT GRADUATES ASSIGNED TO BASE LEVEL

THESIS

David O. Block, Major, USAF

AFIT/GIR/LSR/91D-1

The views expressed in this thesis are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.



AFIT/GIR/LSR/91D-1

A DELPHI FORECAST OF 1996 ROLES: AIR FORCE INSTITUTE OF TECHNOLOGY INFORMATION RESOURCE MANAGEMENT GRADUATES ASSIGNED TO BASE LEVEL

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Information Resource Management

David O. Block, B.S., M.L.A.

Major, USAF

December 1991

Preface

This study concerns itself with ideas about the future. These ideas come from a group of people whose intellectual and organizational abilities and promise of professional growth caused senior Air Force Information Management leadership to single them out for an education which would equip them with new, needed ideas. Valuable resources were expended to discipline their objective communications, to provide them with practical technical information, to refine their thinking with scientific inquiry, and to have them earn the distinction of being called masters of the science of information resource management. The dividends these people seek to return to the IM community and to the Air Force at large are refined, forward-looking ideas.

The participants in this research, by attending AFIT IRM studies, perhaps unwittingly gave up some amount of ignorance about IRM matters and traded it for a wide-eyed, awe-inspiring view of the challenges that confront the expeditious and efficient development of the Air Force's information resources. Certainly, trying to communicate to those who sent them the importance of what they have learned and what it can and should mean to the Air Force is not the least of their challenges today.

I thank each of the IRM graduates who took time from their busy schedules to assist in this research, not once, but on two separate occasions. Their ideas should find good soil, be nurtured with care, and bear fruit for others who follow them as well as for the Air Force, as it is propelled into the age of Instant Information.

I am deeply in debt to Freda F. Stohrer for her unfailing patience, considerable assistance, and many valuable hours of helping me to develop a disciplined thinking and writing consciousness.

Finally, my heartfelt gratitude goes to my wife Kim for her steadfast understanding and support thoughout these long AFIT months.

– David O. Block

Table of Contents

List of Figures

Figure Page

List of Tables

ABSTRACT

Graduates of the Air Force Institute of Technology's Information Resource Management master's degree program who are subsequently assigned to base-level positions believe their IRM expertise is wasted in base administration roles that preclude the use of their up-to-date technical educations in managing automated information resources.

This research forecasts the role AFIT IRM graduates assigned to base-level positions will need to fill by the year 1996. The research further determined what changes are necessary to resolve the perceived differences between current and forecast roles for these graduates.

The Delphi survey method of forecasting was selected as an effective method of discovering what role the graduates will need to fill five years from now. The primary advantage of this method was that it provided a select group of knowledgeable individuals an opportunity to develop a consensus of opinion in regard to the general role and specific functions of an IRM graduate at base level. Also, this method ordered the experts' ideas about what it will take to transition to the future role.

A DELPHI FORECAST OF 1996 ROLES: AIR FORCE INSTITUTE OF TECHNOLOGY INFORMATION RESOURCE MANAGEMENT GRADUATES ASSIGNED TO BASE LEVEL

I. Introduction

I feel like a slave who has learned to read.
– Anonymous IRM Graduate (35:167).

Background

According to the Air Force Directorate of Information Management Plans and Programs Branch (SAF/AAIAX), several graduates of the Air Force Institute of Technology (AFIT) Information Resource Management (IRM) resident master's degree program believe their new IRM expertise is being wasted in old style jobs that preclude the use of their expensive educations. Such informal telephone feedback was formalized with the publication in 1990 of Richard McGhee's AFIT thesis research (35). McGhee interviewed IRM graduates and confirmed that five of the six graduates assigned to base-level were performing jobs which made no use of their specialized IRM educations. McGhee's research led AAIAX to request further AFIT research concerning their roles (28). It should be noted that all these officers' position assignment codes reflect a need for the graduate IRM degree.

An explanation of the discrepancy between the jobs these graduates were educated for and the ones they are performing will clarify the general

problem: IRM graduates assigned to base-level jobs are filling roles which make no use of their technical graduate educations in Information Resource Management, even though their duty positions reflect a coded requirement for an officer with the specific expertise they possess.

The Air Force Institute of Technology's School of Systems and Logistics is ". . .the Air Force's center for education and research programs in the management of defense systems" (13:2), and its graduate Information Resource Management (IRM) program is an

> . . .interdisciplinary curriculum which educates students in the analysis, design, development, and implementation of information systems in complex organizations. The graduates are expected to interact with both technical and nontechnical organizational functions to appropriately apply computer technology in these functions, and to effectively manage organizational information resources to facilitate performance. (13:3)

Information systems comprise all of an organization's technological resources which store, retrieve, and compute data, and which process and provide information throughout all levels of the organization.

IRM graduates in base-level jobs currently do not perform information systems analysis, design, development, or implementation; nor do they manage organizational information resources to facilitate performance; nor do they interact with other organizational functions to apply computer technology. These graduates are also equipped and expected to tackle other technical issues such as analyze IM problems with descriptive and inferential statistics, apply computer-based applications to support management decision making, and make information systems decisions, yet these functions are not part of their current roles as IM officers.

Instead, the most significant functions of IRM graduates at base level now are managing the physical movement of official mail on the base with vehicles and relatively unskilled labor; providing duplication and reproduction services in a small base printing shop; supervising the people who retrieve, store, and dispose of physical records; informing their immediate supervisor of internal Base IM and customer service matters; performing temporary details and other taskings which are outside the realm of IM; and directing IM specialists who manage the warehousing, distribution, and coordination of printed publications and forms, and those who proofread and authenticate (hand stamp) special orders. In short, the base-level roles of IRM graduates preclude the use of their IRM expertise.

During his telephone interviews with these graduates, McGhee asked open-ended investigative questions. McGhee prefaced the first of his two questions by citing the goal of the AFIT IRM graduate program: ". . .to assist the Information Management (IM) career field in transitioning from a relatively nontechnical career orientation to one of higher technical orientation." He followed this statement with the question, "Do you believe the IRM program is accomplishing that objective" (35:161)? The responses to McGhee's question from five of the six graduates in base-level jobs were:

> I'm not fully used, just sitting here forgetting everything I learned. . .I'm not getting any (chances) to do anything (with my education). . .not putting our IRM management skills to use. . .a lot of roadblocks to getting our (IRM) skills utilized. . .the Air Force spent a lot to educate me and it's not being realized. (35:161-3)

McGhee's other question was: "Do you have any other comments which you feel might help our study" (35:167)? The same graduates' responses again highlighted roles that don't make use of their educations:

> I don't think the wing and base commanders know what the Air Force spent its money training us for. . .we need a clear role definition. . .We are going in too many different directions. . .I am doing my best to (communicate) my training to the base. . .We need to look more closely at where we send grads. . .The coding of IM slots for IRM assignments is a joke. (35:167-9)

In short, these graduates expressed concern that their roles require them to perform duties that do not require an IRM degree. My research confirms McGhee's general finding that these graduates are responsible for "old style" base administration duties (that is, ensuring printed information moves on the base), instead of being able to apply their up-to-date technical educations to managing automated information and its associated computer resources. Even though their positions are coded in the personnel system as requiring a officer with a Master of Science degree in Information Resource Management, their base-level roles preclude the use of their IRM educations.

General Issue

Most feedback from IRM graduates assigned to base-level positions has one central theme: frustration with the lack of an updated and clearly defined role which will make effective use of a graduate's IRM education at base level. Their responses also reveal problems with ineffective use of funded graduate educations on the job, lack of a sense of direction from Air Force IM leadership in the use of IRM graduates, and concern about which IM positions are coded for an IRM degree (35). These graduates express satisfaction with their advanced technical educations and feel they are prepared to meet current information management challenges in their assignments, but indicate their roles preclude those IRM functions the graduates believe they are capable of performing and should be doing. In

short, they have been prepared to meet the challenges of the future but find themselves in jobs still grounded in the past. One graduate expressed it this way:

> Once you teach a slave to read, he'll never be satisfied as a slave. Too many folks think we need to still be slaves. I feel like a slave who has learned to read. (35:167)

The analogy may be colorful and oversimplified, but it summarizes dramatically the concern these graduates have about not being able to apply their educations to current and future IM challenges.

Specific Problem

The research problem was to determine what role is most appropriate for these graduates. Since clear position requirements must be defined toward which change can be effected, and because role definitions cannot be changed instantly, the specific problem was to identify what role IRM graduates assigned to base level will need to fill five years from now.

Research Objectives

This research documented the roles these graduates will need to fill five years from now by using the technological forecast by a panel of IRM experts. This research was also designed to gather the experts' ideas on how the projected roles are to be realized.

Investigative Questions

These questions were designed to answer the research objective:

1. What roles are IRM graduates at base level filling now? The answer to this question provides a baseline from which change starts.

2. What role will IRM graduates at base level need to fill five years from now? The answer to this question is the change that is needed.

3. What actions are required to resolve the differences between current and forecast IRM graduate roles at base level? The answer to this question is the means by which change should be made.

Assumptions

There was one fundamental assumption made as the basis for this research: the graduates who voice concern about not being effectively used know what they are talking about. These officers were selected through a highly competitive process to enter IRM studies, and have completed a rigorous, 18-month, graduate-level technical degree program at a nationally recognized and accredited academic institution. According to Colonel William O. Nations, former USAF Director of Information Management and Administration, "AFIT IRM graduates are the Air Force's best information resource management experts" (36).

Captain Dan Fogerty, IRM program coordinator in the Information Management Officer Resource Management Section at Headquarters Air Force Military Personnel Center, described the competitive selection process for the 1991 class, which has essentially been the same each year (19). Approximately 300 Information Management (IM) officers requested selection for the AFIT IRM program. As a result of competitive attributes such as prior academic performance, potential for graduate study, duty performance, career field maturity, and promotion potential, 10 officers were selected. These individuals represent less than one-half of one

percent of the IM career field. Upon graduation of the 91D class, all IRM graduates to date will represent a scant 2.5% of the IM career field.

The rigorous AFIT IRM curriculum consists of 78 quarter hours in information systems analysis, design, and management; executive and decision support systems; organizational behavior and development; database management; and computer systems networks and applications. The graduates have a firm foundation in applied statistics, quantitative decision making, research methods, professional communications, as well as a demonstrated proficiency in technical writing and the management concepts of logistics, economics, contracting, and federal financing. The AFIT IRM curriculum is shown at Appendix A on page 76.

AFIT IRM graduates are a highly select, well-educated group of senior captains and majors recognized as experts within the IM career field. When five of the six IRM graduates at base level say their educations and expertise are wasted in their roles, it was assumed they are correct. That became the basis from which to begin this research.

Scope

The problem McGhee uncovered applies only to IRM graduates assigned to base-level positions. My research developed what the research panelists forecast as the most effective role in the near-term future for IRM graduates assigned to base-level positions.

Limitations

This research did not investigate how specific IM positions are identified and coded as requiring the IRM advanced academic degree, nor did

it propose to answer the question of which positions should be coded. Likewise, no examination was made of assignment policies for IRM graduates. This too, is left to further study.

Justification

The U. S. Air Force recognizes the need for capable information resource managers and annually provides a specific number of competitively selected information management officers with a graduate technical degree in IRM. Because of the significant costs of an AFIT education to satisfy this USAF need for IRM expertise, the roles of these graduates should be redefined to make the most effective use of their educations and expertise.

The number of IRM graduates who are being assigned to base-level jobs is increasing. Just after the publication of McGhee's research, nine of the 35 IRM graduates (26 percent) had been assigned to base-level positions. Only one year later, 15 of the 45 graduates to date (cumulative, 33 percent) will have assumed roles at base level. Future assignments of IRM graduates will be almost overwhelmingly to base-level jobs for two reasons: at present, only those IRM-coded positions at base level remain unfilled, and higher-level positions in the future will most likely be filled by IRM graduates who are currently serving at base level.

Given 1) the recognized need for IRM capability, 2) the cost to educate and assign this talent, 3) the growing proportion of these members assigned to base-level jobs, and 4) a majority opinion among IRM graduates in these jobs that they are not able to use their IRM capabilities, it was at least prudent, if not imperative, that an effective role for AFIT IRM graduates assigned to base-level positions be defined by experts in this area.

II. Literature Review

> I've been in the information systems business for 35 years now, and it seems to me that the field has faced an identity crisis the entire time. (17:vii)

Introduction

Air Force officer graduates of AFIT's Master of Science program in Information Resource Management, who are subsequently assigned as senior, base-level chiefs of information management, have found a wide disparity between the roles they expected to fill and the roles they actually play. Ralph Carlyle opens his description of this disparity with a tongue-in-cheek characterization of the highly popularized notion in the late 1980s of the emergent roles of chief information officers in the corporate sector:

> A torrent of books and magazine articles have painted an idealized portrait of the new "renaissance" men and women, the so-called chief information officers, or CIOs. According to their legend, CIOs are corporate eagles, using the view from their aeries to plot long-term strategies that unite the business and technology sides of the house. (6:50)

Chief information officer (CIO) is a term coined by William R. Synott in his 1981 book, Information Resource Management: Opportunities & Strategies for the 1980s (10:78). Synott describes the ideal CIO role as that of an executive-level manager of an organization's information systems and resources who provides to senior management strategic information derived from those resources in order to help achieve the overall ends of the organization. In the Air Force, the IRM graduate serving as the Chief Base Information Manager (IM) performs in a function similar to the CIO's.

The CIO and the IRM graduate Base IM are the ranking information management officers for both a company and an Air Force base, respectively. Although both possess the necessary expertise to manage the information resources of their organizations, the Base IM lacks the span of control the CIO has over a company's information systems. A major similarity between the CIO and IRM is that the ideal role of each is significantly different from the actual role played.

This chapter summarizes several views on the development of the chief information management officer experience and is divided into three sections: the current role of the CIO as it relates to Air Force experience, outlooks for the future of information resource managers, and a brief summary of the significance of the literature in this research.

The Current CIO Role

This section of the literature review attempts to answer three questions about the current reality of the CIO experience. It then connects those answers to the Air Force experience. To what extent is the ideal CIO role a reality? What relationship exists between the CIO's rank and the importance of the organization's information systems? And finally, what other challenges does a CIO face?

To What Extent is the Ideal CIO Role a Reality? In the early 1980s, information systems exploded out of back-office clerical jobs, managers began tapping into corporate data bases, and far-flung networks were being used to transfer information routinely. CIO positions were created for persons supposed to integrate corporate information systems technology with the strategic aims of the organization. By 1989, "40% of Business

Week Top 1000 companies had a CIO. But despite this early rush to hire them, only a handful have ever gained real power" (10:78).

Eric Brown et. al. reported the extent to which the ideal CIO concept is a reality in smaller companies. He found that in these companies only four of 15 top information executives consider themselves CIOs and that their companies have not yet fully addressed the issue of using information systems in competitive strategy (4).

In larger organizations, a greater percentage of senior executives function as the CIO. In 1990, Eugenia Brumm studied 200 of the top Fortune 500 services and industrial firms. She learned that 70.5% of senior information resource managers operated in a position similar to a CIO, though did not necessarily report to top management (5). This percentage appears to be a significant increase over Carlyle's 1988 survey of 400 top information systems executives where "Fifty-nine percent of respondents thought of themselves as CIOs, yet only 27% reported directly to the top of the company" (7:50).

AFIT IRM graduates in base-level positions serve as the Chief of Base Information Management and almost invariably hold the rank of captain. Even though they serve the information management needs of the entire base, they are assigned three or more management levels below the senior commanding officer on the installation. They typically report to a major or lieutenant colonel who is commander of the mission support squadron (which includes military and civilian personnel, social actions, education, and base audiovisual services). The mission support commander reports to a colonel who is the commander of base support (which includes civil engineering, security police, disaster preparedness, housing, and food

services). The base commander reports to the wing commander, another colonel, who exercises senior authority over the entire installation. Though the Chief of Base Information Management has an impressive title and performs an old style of administrative service for the entire base, he or she operates several organizational levels below senior leadership and exercises no management of the installation's information systems which, in fact, have no centralized management.

CIO's Rank and Importance of an Organization's IS. Kathryn Hayley found that one of the most significant and difficult challenges facing CIOs is establishing themselves as valuable executives with an important role in information systems and corporate management (23). Study after study reports that the senior information resource manager's rank in relation to top management was key to determining an organization's intent for strategic application of its information resources. Bhanu and T. S. Raghunathan report that "the proper fit [must exist] between the organizational importance of IS and the organizational rank of the chief information systems officer" (38:123).

The IRM graduate who serves as the Base IM realizes better than most that his or her modest rank and relatively low position in the larger base organizational scheme is a reflection of the low importance with which base information systems as a whole are viewed. Though some highly compartmentalized systems manage information of militarily strategic value, the lack of a base IRM position that reports to senior leadership and which has a higher grade authorization is evidence that the Air Force does not view or manage its collective base information systems as strategic

resources. Indeed, Information Management is one of the few USAF career fields that have no grade authorizations higher than colonel. See (12).

Other Challenges. CIOs face other problems with respect to establishing this new function within ongoing operations: they must cope with uncertain role expectations, develop the proper mix of managerial and technical skills, surmount organizational obstacles, and find ways to communicate effectively with top management.

Uncertain Role Expectations. In his 1987 article, Synott points out the ideal role of a CIO: an "integration planner who spearheads corporate-wide maximization of an organization's information systems for strategic applications" (40). Further examination reveals that the reality of a CIO's ability to spearhead and maximixe organizational information systems roles is much less certain than this ideal description primarily because of the lack of organizational status of CIOs.

Sharon Caudle found, in studying attempts of IRM executives to implement information resource management in agencies of the federal government, that "information as a corporate resource, the guiding value behind IRM, has not caught on " (8:9). Curt Hartog and Herbert Martin's 1985 survey of issues most difficult for information managers to solve revealed one of the top challenges to be "aligning the IRM organization to more closely support corporate business goals rather than an independent support role" (22:353). In discussing his 1989 Coopers & Lybrand/Datamation survey of 550 IS managers, Carlyle confirmed that, among corporate CIOs, only the same 27% who reported directly to top management felt they were able to strongly influence corporate strategy (7).

James Emery said the CIO is not likely to achieve top management status "unless he or she can first put in place an effective enabling infrastructure," one that becomes "the glue that holds the organization together and provides the basis for decision making and coordination" (i7:vii). In a related area, Niv Ahituv et al. found the distribution of information systems and its control was directly linked to the distribution of decision-making authority, without regard to the size, nature, or structure of the organization (1).

Manager versus Technician. Donald Amoroso et al. (2) report that information systems executives serve dual roles as managers and technicians and that the significance of each role has changed over time. While technical competency has decreased in significance, CIO management ability has become more important. In the Air Force, the IM career field is attempting to increase its level of technical competence. However, in both the military and civilian worlds the management concern of the information resource officer increasingly focuses on how to support the organization's competitive endeavors. Synnott concluded that the CIO needs about 80 percent business and managerial skills and 20 percent technical skills (40).

Glenn Mangurian also cites the need for CIOs to learn to deal with new IS technology, but he believes that an ability to develop and exercise a persuasive leadership style in order to merge information technology with a company's strategic goals is more important (32). He emphasizes an important change in the current business environment which directly affects CIOs:

> Top corporate managers expect CIOs to possess a greater overall understanding of their industry than was previously

> required of management information systems managers. The CIOs who do not embrace the strategic perspective needed to meet corporate objectives may well be replaced by nontechnical business managers. (32:12)

In June of this year Emery wrote,

> Indeed, there is evidence that more and more organizations are moving to the concept of the CIO as a senior executive with both a business and technical perspective, who can contribute actively to the formulation of an effective amalgamation of business and IS strategies. (17:viii)

The Air Force IM career field is developing technical expertise which has been lacking in the past. The AFIT IRM program was launched in 1987 to develop needed expertise in the IM officer career field and has a solid management orientation with a core curriculum of specialized, technical information systems courses (see page 76). However, even though IRM graduates at base level have the expertise to manage information systems for the larger strategic ends of the organization, they are by no means beginning to enjoy senior executive status in their organizations.

Obstacles Within the Organization. Caudle writes that information resource managers in federal service "find it difficult to define and explain information management to others in their organizations" (8:8). One of the most frustrating things about the Air Force IM career field is the officers' early awareness that their breadth of understanding and knowledge of the entire organizational structure is often far greater than that of officers in other career fields. This is because the IM role requires the officer from the date of commissioning to act as the primary interface between his or her organization and virtually every other organization on the installation. Very few other officer career field roles require the amount of supervisory, management, and inter-unit liaison experience that

an IM officer begins to develop as soon as he or she enters the Air Force. This organizational insight and expertise, taken for granted among IM officers, is largely unrecognized throughout the Air Force.

Carlyle reports CIOs believe they are the victims of unsympathetic corporate cultures (6). This view is based partly on his earlier work where he states, "already the first wave of managers functioning in the role have drifted into a nomadic existence: victims of power politics and unrealistic expectations. . .relentless pressure to perform in the short term usually precludes sustained executive commitment to long-term projects, killing a CIO's grand plans before they can materialize" (7:52). Magid Igbaria's study showed that

> . . .employees whose career orientations were compatible with their job settings reported higher job satisfaction, stronger commitment to their organization, and lower intentions to leave their organization than employees whose career orientations were incompatible with their job settings. (25:167)

When IM officers graduate from AFIT with a Master of Science in Information Resource Management, they may understand better than many of their contemporaries how to apply their new expertise in organizations. Unfortunately, IRM graduates who go to base-level jobs find themselves moving the mail, stacking records, stamping orders, doing base details, and rarely communicating with senior leadership about information resource management (the kinds of things the IRM has been educated to do).

However, Mangurian cites that the most critical factors in overcoming obstacles to a CIO's success are communicative ability and the management of IS creativity and innovation. He believes the CIO's source of

power will also arise from their technological empowerment of other employees in the organization (32).

Communicating with Top Leadership. Mangurian highlights the importance of close communications between the CIO and senior management "to promote an understanding of the IS function, its potential strengths and weaknesses, and its role in the organization" (32:14). In referring to the need for increasing recognition of information systems as a strategic resource, Raghunathan and Raghunathan say the information executive must

> . . .make concerted efforts to inculcate IS awareness within the senior management team. This involves keeping them continually appraised of critical issues and trends affecting information management. Such awareness could help senior management appreciate and understand both the potential and problems associated with IS, and thus facilitate appropriate IS responses to organizational demands. (38:113)

Close communication between the senior officers of a military installation and a base IM officer assigned several rungs down the reporting heirarchy is one of a number of significant challenges faced by AFIT IRM graduates who serve as chief information officers at base-level. However, a few IRM graduates have managed to demonstrate the value and importance of base information systems successfully by developing base centers to provide small computer training for members of other organizations. These base training centers have helped to develop an awareness among senior leadership on these bases of the potential of both the training centers and the IRM graduates who have instituted them.

Outlooks for the Future of the CIO

To maximize opportunities for success in information systems in the future, the CIO needs an appropriate blend of technical knowledge and management skills (26). The CIO's relationship with top management is also important. Finally, IRMs in government jobs need to find new approaches to turning their information resources into strategic resources.

Technical Knowledge and Management Skills. Mangurian has examined the CIO's growth from compartmentalized technician to a manager whose success derives from an ability to empower other executives within the organization:

> In the future, CIOs will exercise their influence through participation. IS users will be more knowledgeable, and this will dispel the myth that technology is beyond their intellectual grasp. Nevertheless, IS personnel will still possess more knowledge and expertise in many areas...than will users. Thus, a new source of power will be a knowledge of what technology can offer the organization and a broad perspective on the role of information systems in business. (32:15)

Relationship with Top Management. Brown believes senior management will remain uncertain about the utility of the CIO especially in smaller organizations (4), and Carlyle thinks some companies may eliminate the in-house IRM function in favor of outside vendors (6). However, Raghunathan and Raghunathan's data suggest that an increasing number of CIOs who consider themselves to be successful in their roles share some common characteristics.

> The profile is of an individual who reported to a key senior executive, viewed him/herself as a manager rather than as a technician, saw a constantly evolving structure for the role, and focused more on effectiveness than on efficiency considerations. These IS executives interviewed. . .also listed the ability to

maintain communication links with top management as a critical success factor. (38:124)

Other IRM Challenges. Information resource managers face other challenges in the future. Amoroso et. al. introduced the idea that IRMs must find ways to expand the roles and contributions of information systems within the organization and find ways to measure IS effectiveness and productivity (2). Hartog and Martin's study shows the top two IMR issues in 1985 were "gauging IS effectiveness" and "long-range planning" (22:352).

Caudle et. al. pointed out that in order for the federal government to achieve IRM success, information systems planning and annual budgeting should be linked together in long-term plans "as a mechanism for overcoming the short-range emphasis in government on political issues" (9:184). Peter Keen said, "government agencies really need to understand the issues of architecture, so we can get people away from being locked into the short-term issues. I support an information age commission to help agencies take a broader architecture view" (29:74).

James Brancheau and James Wetherbe's 1987 Delphi study of 20 key issues in information systems management among public IRMs and private CIOs showed the top five issues to be, in order of importance: "strategic planning, competitive advantage, organizational learning, developing the information system's role and contribution, and IS alignment in the organization" (3:27).

Conclusions About the Role of the CIO

The number of CIOs and IRMs is increasing in recent years, though the percentages of information managers who fill these positions and actually report to top management is smaller. Their rank and position in the

organization directly relate to the importance of that organization's information systems in strategic applications. AFIT IRM graduates serving as installation chiefs of base information management have neither executive rank nor proximity to senior leadership. The results of Bruce Harmon's study led him to conclude, "it appears the Air Force presently does not place a high value on its information management systems" (21:5-10).

My thesis research seeks to define a role for IRM graduates that will enable them to develop technically-oriented, strategically applied information systems for their installations. This research also presents reliable ideas on how this new role can best be effected.

Challenges for IRM graduates at base level will include uncertain expectations from one organization to the next. Since these graduates have the necessary technical skills, they will need to develop the management expertise needed to overcome internal organizational obstacles. Greater emphasis will be placed upon the individual management skills of the IRM graduate which are cited as the single most significant asset in the success of any information officer.

Sirkha Jarvenpaa and Blake Ives noted, "top management support is an essential ingredient for achieving significant success in applying information technology" (27:204). An ability to communicate well with top management will be a key factor in the success of base-level IRM graduates. Communicating effectively with senior leadership will offer the greatest challenge and opportunity for the enhanced effectiveness. This communication will foster a broader knowledge of the benefits of information technology throughout the installation.

III. Methodology

> The Delphi procedure is characterized by three features which distinguish it from the usual methods of group interaction. These are: (a) anonymity; (b) iteration with controlled feedback; and (c) statistical group response. (33:20)

Introduction

The methodology chosen to determine the roles AFIT IRM graduates assigned to base level will need to fill five years from now is a technological forecasting method known as the Delphi technique. This chapter examines the development and mechanics of the classic Delphi technique, examines the specific reasons for its use in this research, and presents the manner in which the Delphi was applied in this research.

The Delphi Forecasting Method

Robert Erffmeyer et al. explain that the Delphi forecasting technique ". . .originated in the early 1950s in the Air Force sponsored defense research, "Project Delphi," conducted by the RAND Corporation. The research focused on the use of expert opinion to "obtain the most reliable consensus of opinion from a group of experts. . .by a series of intensive questionnaires interspersed with controlled opinion feedback" (18:120).

According to George Mandanis, ". . .in its original form, the Delphi technique was a method employed for the systematic solicitation, self-review, and aggregation of experts' conjectures about matters that are uncertain (31:161). He goes on to describe the original Delphi experiment: "Eighty-two individuals from all over the world were

carefully selected to 'conjecture,' together, about several aspects of the human environment fifty years hence. The foci of the questionnaire designed for this purpose were: scientific breakthroughs, population growth, automation, space progress, probability and prevention of war, and future weapon systems" (31:163). Since this initial experiment, others have adopted and used the technique, for a variety of purposes, in the United States and elsewhere (20).

Olaf Helmer, who developed the Delphi method in collaboration with Norman Dalkey, reflected on the initial development of this method to analyze the future:

> [The Delphi technique] attempts to make effective use of informed intuitive judgment. It derives its importance from the realization that projections into the future, on which public policy decisions must rely, are largely based upon the personal expectations of individuals rather than on predictions derived from a well-established theory. (24:118)

The Classic Delphi. Although his description contains procedural assumptions about anonymity, the control body, and number of iterations, Erffmeyer gives a satisfactory explanation of the classic Delphi technique:

> Participants in Delphi never assemble nor do they know the identity of the other members of the group. After receiving the decision-making task, members develop their own solutions to the problem. Upon reaching a solution, each member returns his or her input to a central monitoring committee, which then pools each member's responses and comments. The pooled information is returned to the group members who may then compare their responses to those of the other participants and, if they wish, may change their opinions or add further comments. This information is again returned to the monitoring committee for collation of the responses. This reiterative process continues until there is a convergence of opinion or until a point of diminishing returns is reached. (18:121)

Reasons for Using the Delphi Method in this Research

Anonymity. The Delphi technique eliminates the primary disadvantage of the more traditional method of group decision making. Helmer points out that a round-table discussion among experts, with the objective of formulating a group position,

> . . .is open to a number of criticisms. In particular, the outcome is apt to be a compromise between divergent views, arrived at, all too often, under the undue influence of certain psychological factors such as specious persuasion by the member with the greatest supposed authority, or even merely the loudest voice; the unwillingness to abandon publicly expressed opinions; and the bandwagon effect of majority opinion. (24:120)

In some variations of Delphi applications, participants are allowed and sometimes encouraged to communicate with one another to speed up the iterative process (33). However, for my research, anonymity among participants was used to eliminate possible influence from military rank or position. Moreover, this research measures the convergence of opinion between iterations, and discussions among participants would likely conceal the true rate of convergence between rounds.

Effectiveness. Delphi forecasting is a ". . .way of systematically combining individual judgments to obtain a reasoned consensus" (24:116) to project some future development or need. According to Helmer, its

> . . .unique feature and potential merit lie in requiring the expert to consider the objections and concepts of other group members, in an environment free from bias caused by personalities. (24:116)

Likewise, H. W. Lanford cites the effectiveness of the Delphi as its

> . . .reasoned, self-aware opinions, expressed in the light of the opinions of associate experts. Thus these predictions should provide a sounder basis for long-range decision making than do unarticulated intuitive judgments. (30:22)

Accuracy. The accuracy of Delphi predictions are ". . .superior to conventional business forecasting methods" (33:31). The research of Frederick Parente et al. on Delphi accuracy led them to conclude:

> . . .when the judgments of a large group of people are combined (even if they are not experts in a given field), the accuracy of the majority vote is. . .more accurate than those of 95% of the individual panelists, but do not exceed in accuracy the best panelists. (37:173-174)

Self-Rating. In self-rating, also referred to as weighted opinions in some Delphi applications, ". . .panelists are asked to give themselves a rating as to their degree of expertness on each question" (33:27). Then, only the responses of the panelists who rank themselves highest are used. Helmer's evaluation of this variation "showed this select median, compared to the median of all responses, is closer to the true value" (24:122).

Panelists in this research may have believed that their experience as an IRM graduate in a base-level position, or lack of it, had a bearing on their expertness in a particular question. The details of the use of self-rating in this research are discussed later in the chapter.

Quantitative Description. Lanford offers an illustration of the efficiency with which Delphi responses can be described:

> In Round 1. . .the IQR (interquartile range; that is, the interval containing the middle 50% of the responses) and the median are determined for each question; this information is then fed back to the respondents. In Round 2, the respondents are asked to reconsider their previous answers in light of the IQR and the median and can then revise their answers, if they so desire. If this response lies outside the IQR, the respondent is asked to state the reason his answer differs from the majority judgement or consensus of the group. (30:21)

The level of consensus on each question can be measured as well as the amount of change in opinion in subsequent iterations. This quantification may also apply to open-ended responses to questions, though the interpretations must be more carefully described.

Reliability. A survey measurement is reliable to the degree that it supplies consistent results; in other words, it "should give essentially the same results if the forecasting effort is replicated, either by the same director or by another" (33:48). Joseph Martino conducted research into the reliability of the Delphi and found,

> . . .with a panel no larger than 15, consisting of a cross section of experts in the given field, it is highly unlikely that another equally expert panel will produce a radically different median. . .forecasts produced by the Delphi procedure are reliable; that is, different panels will tend to produce about the same results. Furthermore, this reliability can be enhanced by choosing a panel sufficiently large. (33:49-52)

As detailed in the next section, 29 experts were asked to participate in the forecasting panel of this research. Sixteen of them participated. In view of the panel size, my application of the Delphi method should ensure the reasonable reliability of the research findings.

How the Delphi was Applied in this Research

Research Participants. Of the 35 AFIT IRM graduates in the USAF IM career field to date, nine are assigned to base-level positions. Twenty of the 35 IRM graduates are assigned to MAJCOM information management divisions where they manage those programs which directly affect the graduates at base level. These 29 IRM graduates were the selected participants since they are most closely associated with the roles and

responsibilities of graduates at base level. Other knowledgeable and experienced individuals in the Air Force IM career field could have offered excellent insights, but only these 29 have an enhanced view of the technical future possibilities of IM by virtue of their graduate IRM degrees, as well as a direct daily concern with the base-level IM functions.

Survey Instruments. The survey instruments are two questionnaires. Both questionnaires support (a) the primary research objective of determining the required future roles for IRM graduates assigned to base level as forecast by a panel of experts in this area, and (b) the secondary research objective of exploring the means by which the projected roles might be realized.

Questionnaire One. Used in Round 1 of the Delphi, this instrument is composed of measurement questions in four parts. (Refer to Appendix C on page 78.)

Part 1. Demographic questions that collected name, rank, years of service, total IM experience, job title, and time in assignment.

Part 2. Controlled, job-related questions to answer the first investigative question: "What roles are IRM graduates at base level filling now?" Panelists were asked to provide one overall self-rating of their level of expertise in answering the questions in this part. These questions, in two areas, are the key role function descriptions found in (a) the Information Management Officer Specialty Summaries (12), and (b) the AFIT School of Systems and Logistics IRM program objectives (13). Each individual function is explained and the rationale for their use as research questions is presented later in this chapter.

Part 3. Controlled opinion questions to answer the second investigative question: "What role will IRM graduates at base level need to fill five years from now?" Panelists were asked to provide one overall self-rating of their level of expertise in answering the questions in this part. These questions are the same key descriptors of the IM Officer Specialty and IRM program objectives used in Part 2 of the survey.

Part 4. Open-ended opinion questions to answer the third investigative question: "What changes are necessary to resolve any differences between current and forecast IRM graduate roles at base level?"

Questionnaire Two. Used in Round 2, the second survey instrument contains exactly the same questions as the first, except that the only demographic data requested was the code name of the participant. Code names allowed me to align and compare Round 2 and Round 1 responses. (Refer to Appendix D on page 84.)

Questionnaire two was sent to each panelist along with an analytical summary of the entire panel's responses to the first questionnaire. The second instrument was expanded to have participants explain any of their second-round responses that continued to fall outside the majority opinion (the IQR) of the panel for each question in Round 1. The use of the Round 1 summaries in conjunction with questionnaire two is explained in greater detail in the following section.

Role Function Response Items. Air Force Regulation 36-1, the Information Management Officer Specialty Summaries (12), outlines the current general responsibilites of IM officers. These duty descriptions provide most of the role function queries in the surveys since they make up a comprehensive list of duties an IRM graduate at base level is expected to

perform. Similarly, the AFIT School of Systems and Logistics IRM program objectives *(13) provide the remainder of the role function queries since they represent those functions an IRM graduate is educated for and expected to perform after graduation. A brief explanation accompanies each functional item.

a. Assessing capabilities, establishing priorities, and formulating IM plans and programs. This is general 70XX management at a level currently higher than that of the base-level IM.

b. Analyzing IM functions for trends in production, use, quality, and propriety of services. This is general management at the base IM level.

c. Programming automation of high volume, repetitive operations to increase productivity. This applies to physical and electronic information operations both now and in the future.

d. Directing IM specialists in managing publications and forms. This is a base-level managment function.

e. Document security and transmission. This applies to all IM levels and is concerned with the handling, storage, and safeguarding of sensitive and classified information both physically and electronically now and in the future.

f. Official mail and message processing. Currently a base-level function of a physical nature which has future electronic applications.

g. Composing and authenticating special orders. A base-level function of a physical nature which has future electronic applications.

h. Maintenance of the master publications library. Currently a base-level function of a physical nature which has future electronic applications.

i. Printing, duplicating, and reprographics services. A base-level service function which may not fall under IM in the future.

j. Records retrieval, synthesis, miniaturization, storage, and disposition. Currently a base-level function of a physical nature which has future electronic applications.

k. Advising the commander on IM and customer service matters. This is a function at all IM levels though customer service is more applicable to the base-level role.

l. Control creation and use of reports, forms, correspondence, directives, and related records. Currently a base-level function of a physical nature which has future electronic applications.

m. Streamlining and simplifying forms, or revising, eliminating or combining forms. Currently a base-level function of a physical nature which has future electronic applications.

n. Additional duties (permanent functions) not within the realm of information management. These may include, for example, being the unit security manager, squadron physical fitness monitor, or squadron morale officer–duties which the member performs on a continuing basis.

o. Temporary duties (details, taskings) not within the realm of information management. These may include, for example, being appointed to conduct an investigation or inquiry, to conduct this year's fund drive for the unit, to lead a retirement parade–duties which are of a one-time nature.

p. * Apply descriptive and inferential statistics to analyze IM problems and make decisions. This is a function at all IM levels and is more a future function than a current one.

q. * Conduct IM systems analysis and make design decisions. This is a function at all IM levels and is more a future function than a current one, and generally to be expected of those with IRM expertise.

r. * Apply computer-based applications to support management decision making. This is a function at all IM levels, more a future function than a current one, and generally to be expected of those with IRM expertise.

s. * Use economic analysis and financial management for acquiring and controlling resources. This is a function at all IM levels and is generally expected of those with resource management expertise.

t. Conduct or coordinate training for IM specialists. This is an IM function at all levels though it is largely within the realm of base-level.

Data Collection Plan. Questionnaires were mailed in two rounds (iterations) of the Delphi process. The mechanics of each round are explained in detail after a brief discussion of the rationale for the number of rounds used in this research. The final results of the research were provided to each research participant; see Appendix E on page 100.

Number of Rounds. Erffmeyer et al. studied the optimal number of rounds to be used in the Delphi forecast. Although they generally concluded "The results indicated that Delphi groups reached stability in their decision making after the fourth iteration" (18:120), they nevertheless conceded

> It is likely that there are a number of variables affecting the appropriate number of iterations for any given Delphi. These might include the composition of the group of participants, the nature of the problem being solved, and the type of feedback provided for the participants. (18:126-127)

Homogeneuos groups that receive detailed feedback while forecasting in the area of their specialty require fewer iterations to reach stability of consensus. Because the participants chosen for this research were all USAF captains or majors, in the information management career field, awarded the same graduate IRM degree, and to receive the full complement of summarized data available to the researcher after each round, two iterations were deemed appropriate for this research.

In examining the optimal number of Delphi rounds, generally considered to be three or four, Martino revealed "A number of experiments with short sequences have, however, shown that in many cases, there is no advantage in going beyond two rounds" (33:27) because of the similar characteristics of the panelists and their familiarity with the issue. Two Delphi rounds were more than sufficient to solve this research problem as the findings will clearly demonstrate in the next chapter.

Round One. Questionnaires were mailed to participants after preliminary telephone coordination. When the surveys were returned to the researcher, the IQR and the median were determined for each question in Parts 2 and 3. Responses to questions in Part 4 were listed by the researcher in order of frequency. A graphical statistical analysis of the combined panel responses to the questions in Round 1 was prepared. This analysis was returned to the panelists, along with the expanded version of the questionnaire, for Round 2.

Round Two. Panelists were asked to reconsider their previous answers in view of the IQR and median opinions of the panel for each non-demographic question from Round 1. Participants were asked to explain all Round 2 answers that remained outside the Round 1 IQRs. Round 2 responses

were analyzed statistically and prepared for presentation. Particular attention was given to a graphical analysis and discussion of the movement of panel opinion toward consensus between the two rounds.

Dissemination of Final Results to Participants. Each of the final analyses to each question are presented in Chapter IV, and the analysis of Round 1 panel responses provided to the participants is at Appendix D on page 84. A final summary of the panel's opinion was provided to each participant for his or her edification; see Appendix E on page 100.

Summary

The Delphi method combines and refines the opinions of a panel of experts for the purpose of forecasting some future development or need. Its advantages in this research include anonymity for panelists, an effective decision making procedure, a reliable and accurate projection, the opportunity for participants to appraise their expertness in given areas, and an efficient quantitative description of the group's opinion.

The Delphi technique and survey instruments have been successfully used to document what role AFIT IRM graduates at base level are currently filling and what role they will need to fill five years from now. This research method has also gathered the experts' opinions as to what changes are necessary to resolve the difference between current and projected roles.

IV. Findings and Analysis

> Information is data endowed with relevance and purpose.
> – Peter F. Drucker (15:464).

Introduction

This chapter is divided into five sections. The first explains the visual tools used for the final statistical analysis of responses. Next, an analysis of combined response to each of the round-two function questions is presented. These analyses are graphic depictions of the participants' opinions of the significance of each function base-level IRM graduates are expected to perform in their current role and the role participants think should be performed in 1996. The third section presents consolidated views of the functions in their final order of current and forecast significance. Then, the participants' comments on what must occur in order to resolve the difference between current and future roles are summarized in order of frequency of agreement among the participants. Finally, the meanings of the function significance ratings and change recommendations are discussed.

Explanation of Statistical Analysis

Box Plots. A box plot is a graphic method for displaying the 10th, 25th, 50th, 75th, and 90th percentiles of a variable and is commonly used to compare variable distributions. See (39). The utility of the box plot in this analysis derives from the clarity with which it graphically presents the percentages of significance ratings from participants. These percentiles are explained below.

Participants rated the significance of 20 individual job functions in the current and future roles of base-level IRM graduates. Their combined responses for each function are displayed in duplex box plots, which show (a) how significant partipants think a given function is in the present and (b) how important participants believe it should be in the future. The box plot depicts the degree of consensus among the participants concerning the significance of a function. Moreover, combining both the current and future significance of each function in one figure dramatically displays the difference between a function's current and future role significance.

Example Box Plot.

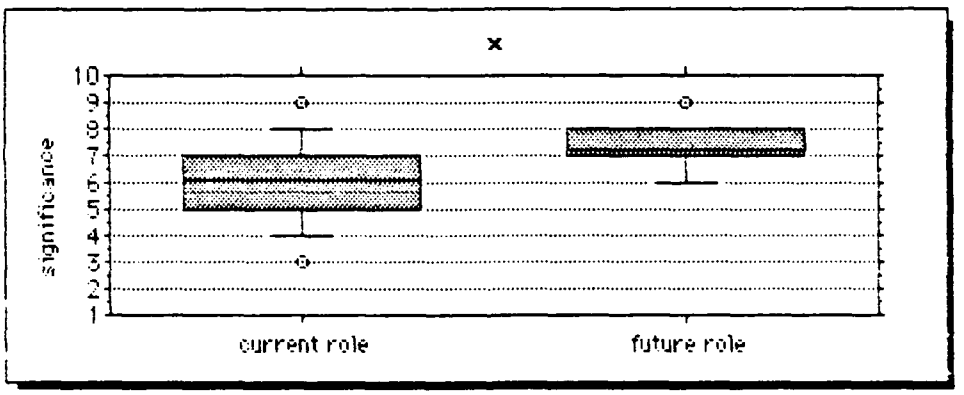


Figure 0. Example of duplex box plot for imaginary function x

Figure 0 presents the hypothetical rating plots for an imaginary function x. This function is one of many that comprise the role. Given a rating range from 1 (insignificant) to 10 (extremely significant), the hypothetical, round-two significance ratings from the participants were:

Current: 9, 8, 8, 8, 7, 7, 7, 6, 6, 6, 5, 5, 4, 4, 4, 3

Future: 9, 8, 8, 8, 8, 8, 8, 7, 7, 7, 7, 7, 6, 6, 6, 6

Current Role. The shaded box, referred to as the IQR or interquartile range, represents at least the middle 50 percent of the 16 significance ratings. The IQR often represents a greater percentage of the ratings as explained below. In other words, a minimum of eight of the 16 participants rated the current role significance of this function for an IRM graduate at base level as 5, 6, or 7. Because the remaining 50 percent or less of the responses are spread both above and below the box, the IQR is said to represent the majority opinion. The top of the box indicates the 75th percentile and the bottom indicates the 25th percentile. See (34).

The horizontal lines extending on stems above and below the box are referred to as "whiskers," and represent the 90th and 10th percentiles, respectively. They define the boundaries of the middle 80 percent of all responses. The small circles represent extreme ratings (9 and 3) that fall in the top and bottom 10-percentiles of all significance ratings for this function. The horizontal line inside the IQR represents the 50th percentile, or the median rating—in this example, just over a significance rating of six.

Important: If no circle appears either above or below the whiskers, then those ratings are included inside the whiskers and their 10 percentiles are added to the whisker. If no whisker appears either above or below the IQR, then ratings in those percentiles have been absorbed by the IQR. As participants more closely agree about a function's significance, fewer circles and/or whiskers will appear outside the IQR. Hence, the IQR is at least the middle 50 percent of the responses, but in many cases, represents a greater percentage of the total ratings.

Future Role. The hypothetical measure shown in Figure 0 indicates that although function x seems fairly significant in the base-level

IRM graduate's current role, it should increase in significance in the future. Greater consensus about the future significance of function x is indicated by the narrower range of the future role IQR ratings (from 7 to 8), than the current role IQR (from 5 to 7).

This plot also illustrates the case where one of the whiskers is absorbed by the IQR. Given the participants' individual ratings of function x's future significance on page 32, this IQR represents at least 65 percent of all significance ratings for this function. All but five of 16 ratings fell within the IQR: the circle represents one rating of 9, the IQR represents 11 ratings of either 7 or 8, and the lower whisker represents four ratings of 6. The plot indicates a very high degree of consensus among the participants concerning the significance of this function in the future. The median response is 7.25 which is a future significance increase of 1.25.

Key Indicators. There are two key indicators of meaning in the plots. First and most important, the smaller the IQR range, the tighter is majority opinion. Conversely, the larger the IQR range, the wider majority opinion. Second, increased whiskers and circles outside the IQR indicate divergence of opinion among all respondents. Likewise, fewer ratings outside the IQR indicate a greater consensus among the group as a whole.

Final Analysis of Current and Future Role Functions

The following duplex box plots depict the panel's opinion of the current and future significance of the 20 functions base-level IRM graduates should perform in their roles. The discussion of the meaning of each plot opens with the median rating (Xm) of the function which is the best indicator of the group's central tendency.

Function A.

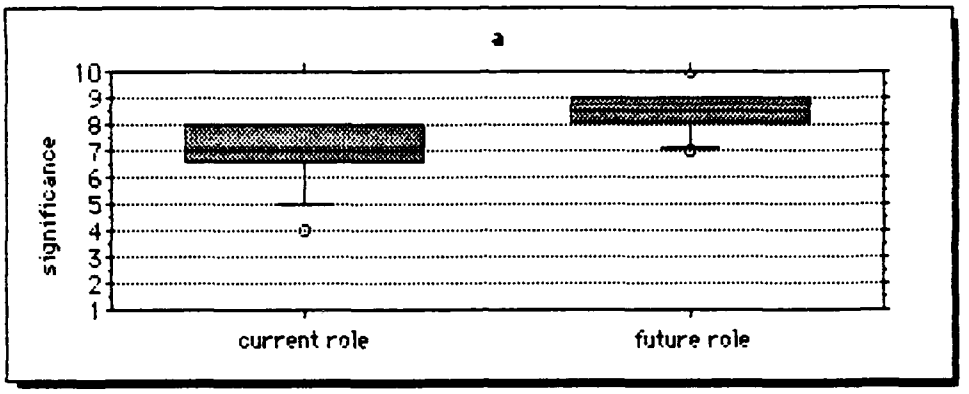


Figure 1. Assessing capabilities, establishing priorities, and formulating IM plans and programs

Current Role. (X_m=7.0) The Figure 1 plot has no upper whiskers or circles, indicating the IQR has absorbed the upper 25 percent of the ratings. Seventy-five percent of all responses (12 of 16) fall within the IQR: seven persons rated this current function as 8 and five rated it as 7. One person gave it a 6 and two gave it a 5. The rating of 4 was accompanied by no explanation of the extreme rating and can therefore be discounted. This plot indicates a very high level of consensus among the experts.

Future Role. (X_m=8.5) Majority opinion in this plot accounts for more than 80 percent of all ratings—an overwhelming consensus. Thirteen persons rated it as an 8 or 9 and two gave it a 7. The person who rated it as a 10 said, "Long-range planning and planning skills are essential to future IM success. Failure (in this area) will make IM fall further behind, widening the technology gap." A very high median response of 8.5 coupled with extremely high consensus and a median projected significance increase of 1.5 marks this as the most important future function in the role of IRM graduates assigned to base-level positions. See page 57.

Function B.

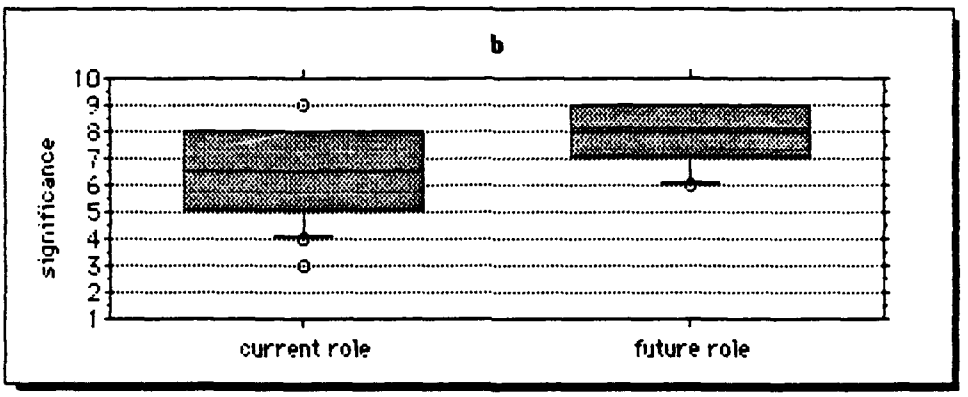


Figure 2. Analyzing IM functions for trends in production, use, quality, and propriety of services

Current Role. (X_m=6.5) Thirteen (81.25%) of the responses form the majority opinion or IQR for the current role significance of analyzing IM functions for trends, with the ratings almost evenly distributed among 5, 6, 7, and 8. One rating each of 3, 4, and 9 fall outside the IQR. With a total response range of six, this plot, despite its large majority opinion, indicates this function is fairly significant, but that there is a wide range of opinion even among the majority. This may be due to the general nature of the function statement, the wide range of concepts it embraces, and the significance of those individual concepts as weighted by each respondent.

Future Role. (X_m=8.0) Despite the current significance, almost 88 percent (14) of the panelists rated the future significance of this function as either a 7, 8, or 9. Seven experts gave it a 9 rating. The two individuals who rated it as a 6 gave no reason for the below-normal rating. It is clear the group thinks all the concepts which form this function will be much more significant in the near future than they are today.

Function C.

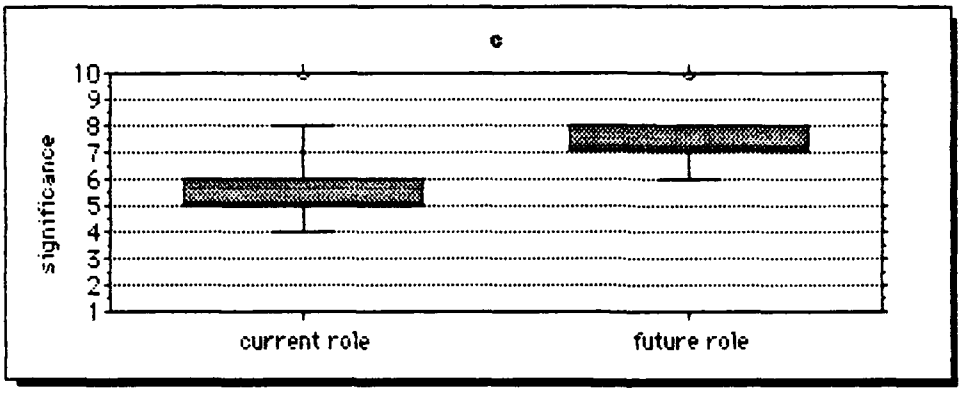


Figure 3. Programming automation of high volume, repetitive operations to increase productivity

Current Role. (X_m=5.0) Ten of 16 responses form the majority opinion in this plot. Seven gave the function a 5 and three gave it a 6. The range of divergent opinion outside the IQR can be accounted for in the comments of the respondents who cited current implementations of automation in various functional areas in several major air commands, which are discussed later in this chapter. However, almost 63 percent of the experts agree that this function is still only moderately significant in the current roles of IRM graduates at base level.

Future Role. (X_m=8.0) A 75-percent majority of the experts believed that this function would have a much higher level of role significance in the future (an extreme increase in its median significance: +3 levels). Both the high level of consensus and the high significance rating indicate this function's importance in future roles.

Function D.

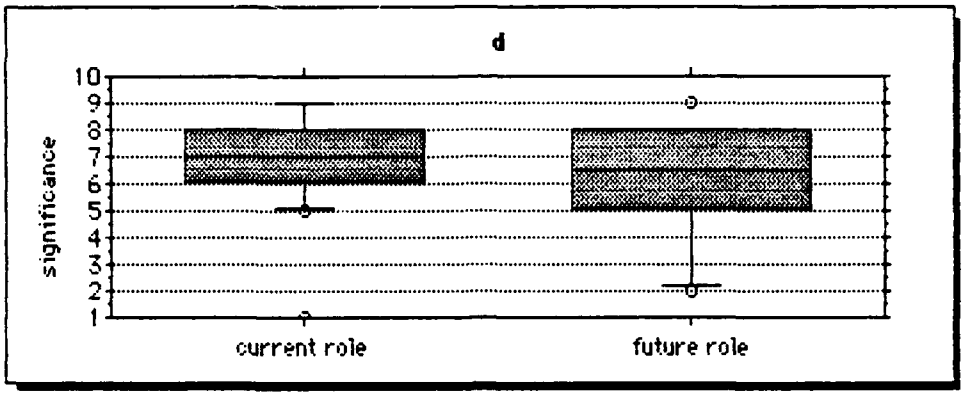


Figure 4. Directing IM specialists in managing publications and forms

Current Role. (X_m=7.0) This plot is almost symmetrically divided by a majority opinion of 73 percent (11) of the experts, five of whom rated this function as a 7. The rating below the majority response was explained, "the IRM grad is not generally directly involved with the management of this function." The group's high level of consensus indicates this function is fairly significant.

Future Role. (X_m=6.5) Although 75 percent of the group indicate a slight decrease in the significance of this function, remarks about coming compact disk-read only memory (CD-ROM) technology account for two points of view. Some experts expect CD-ROM to automate pubs and forms in the near future and think "users will be more independent of IM," consequently, "less IRM judgement. . .management will be necessary." On the other hand, some experts think the IRM graduate five years hence will be right in the middle of CD-ROM implementation for publications and forms, and this function will have much greater significance in the roles they fill.

Function E.

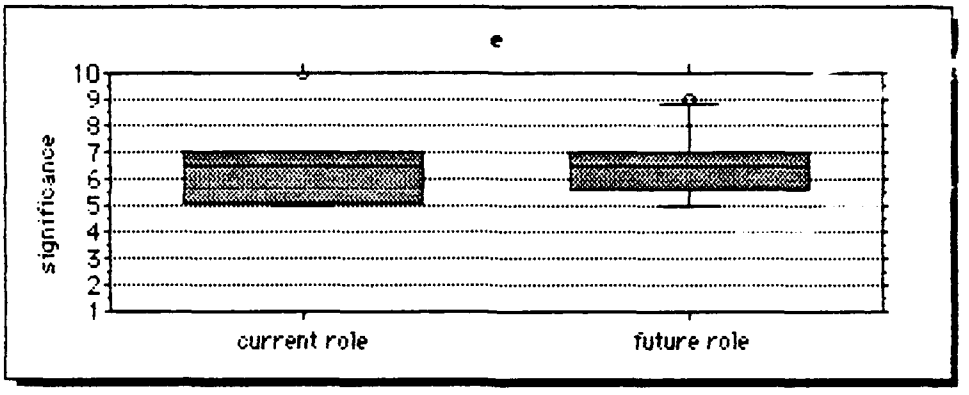


Figure 5. Document security and transmission

Current Role. (X_m=6.5) Experts rate this function as fairly significant and give it one of the two highest levels of consensus among all current functions. The respondent who rated this as a 10 gave no reason for the extremely significant rating. Fifteen of 16 responses (94 percent) fall in the IQR, some of which included comments referring to the base information transfer system (BITS)—essentially, the base mail system.

Future Role. (X_m=6.5) Although the median significance remained the same for the future, the experts think the future of this function differs from its significance in the current role. Eighty-eight percent of the group formed the IQR, but several commented that the future significance applied to electronic transmission security and automated document ("paperless") security instead of to the Base Information Transfer System and locked storage. According to two experts, future IRM roles will be aimed at "moving the maximum possible information over a network (and) security and transmission concerns are key issues in networks."

Function F.

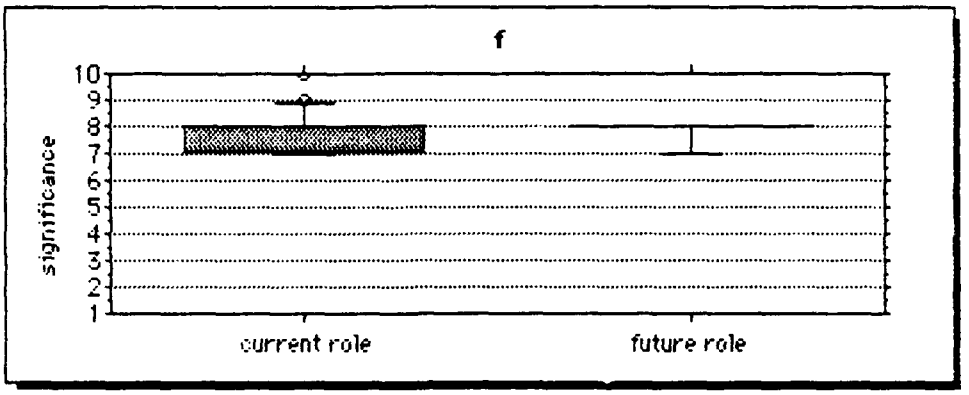


Figure 6. Official mail and message processing

Current Role. (X_m=8.0) The preceding function of document security and transmission overlaps this function to some degree. Seven experts gave this a 7 and seven gave it an eight. Comments with the higher ratings indicated that, although they tended to agree with the majority in general, the recent "decentralization of the postal budget" makes this function more significant in current roles. The IQR contains almost 88 percent of the ratings.

Future Role. (X_m=8.0) This is one of the most interesting plots, with an IQR consisting of more than 81 percent of the ratings, and a median unchanged from the current function's high significance rating. Thirteen experts rated this at 8 and three gave it a 7. Some experts spoke of the coming "mail (budget) decentralization initiative" which will affect the base-level graduate performing this function. In any event, the experts see this too as a changing function as the Air Force transitions into more automated mail and message processing systems.

Function G.

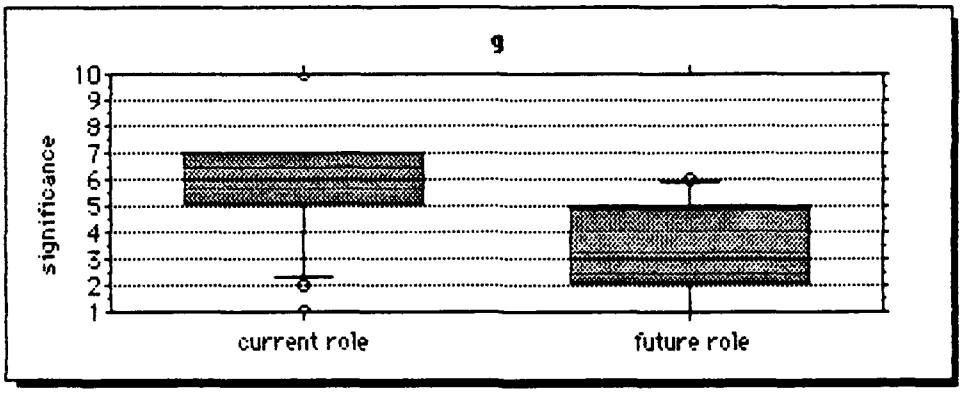


Figure 7. Composing and authenticating special orders

Current Role. (X_m=6.0) Two individuals rated this function as either a 1 or a 2, and indicated "[they] do not perform this function." These ratings do not consider the roles of all base-level assigned IRM graduates and can be discounted in this plot. The person who rated it as a 10 offered no explanation. Thirteen of the ratings form an 81-percent majority opinion of the current significance of this function. This plot shows the widest range of overall opinion but still indicates a fairly tight majority consensus centered on a median significance of 6.

Future Role. (X_m=3.0) The group demonstrates the view that this function will greatly diminish in importance in the future. The experts expressed a range of explanations for this function becoming "a thing of the past" and dropping it to one of the lowest levels of future role significance. Most "do not envision a special orders section in the future," and others think unit "supervisors will authenticate resource expenditures using computer automated accounting." Clearly, this function will be much less significant in the future.

Function H.

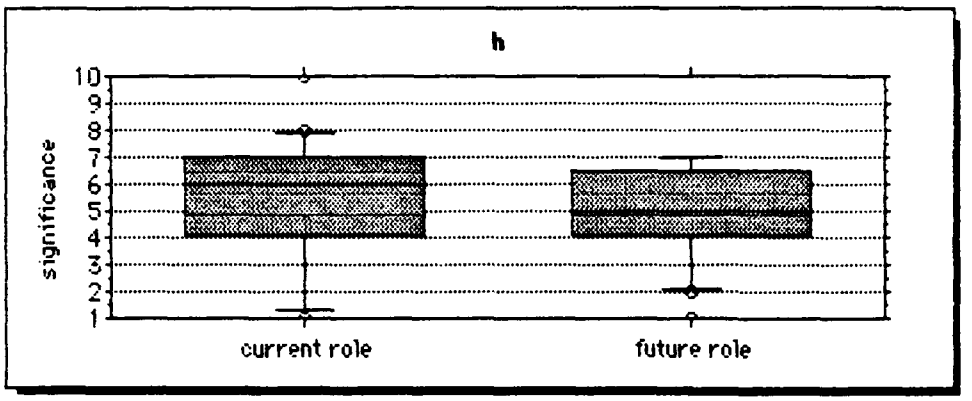


Figure 8. Maintenance of the master publications library

Current Role. (X_m=6.0) Again, experts gave no explanation for extreme ratings indicated by the circles (one 10 and two 2s). However, even without them the median significance of this function would not change noticeably. This function is considered moderately significant in current roles and there is a fair latitude of opinion among the experts.

Future Role. (X_m=5.0) This function generated considerable comment from the respondents, who cited the imminent automation of this function when "the updates to a master library will be done at a single location then transferred to CD-ROM." Most experts think "base level will not have to worry about it," hence the drop in median significance. However, the plot indicates there is still a 56 percent majority who believe this function will maintain some not-less-than significant status.

Function I.

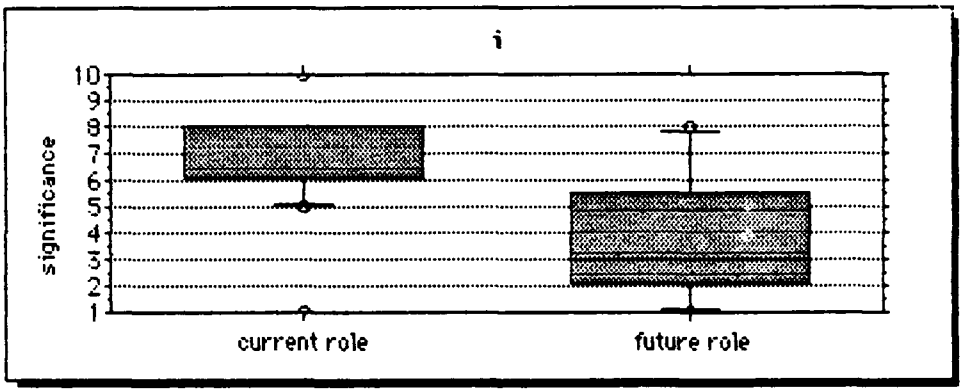


Figure 9. Printing, duplicating, and reprographics services

Current Role. (X_m=8.0) The panel of experts' consensus of opinion is that this function is currently very significant in the roles of base-level IRM graduates. One expert summed up the high significance of this function this way: "I face constant challenges with budget, demand, and job priorities."The rating of 1 is from a participant who indicated this function was not a part of his job and the median response remains an accurate measure of the central tendancy of this plot.

Future Role. (X_m=3.0) This plot indicates a consensus that this function will radically decrease in importance in the near future because the Navy "will be doing virtually everything," or will "greatly reduce IM control." However, some experts think concerns with this function will remain. The two participants who rated the function at 8 said printing demands would remain high "in the R&D and science and technology areas," and "will always be with us." This function will take the steepest plunge in importance in the immediate future of all functions examined in this research. Though forecast to have low significance in the future, other functions are predicted by the experts to become even more insignificant.

Function J.

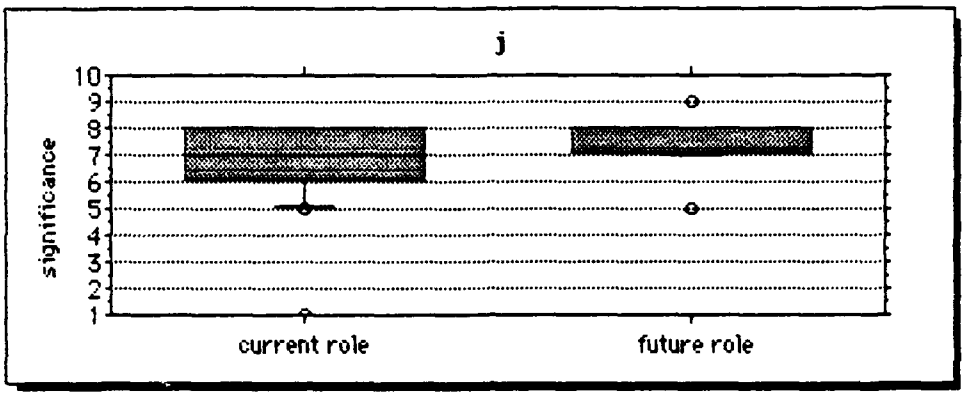


Figure 10. Records retrieval, synthesis, miniaturization, storage, and disposition

Current Role. (X_m=7.0) Although this function represents a fairly broad set of concepts, almost 88 percent (14) of the participants agreed on its current significance in the role of an IRM graduate assigned to a base-level position. Some comments tended to emphasize the concept of records disposition. Other comments downplayed the importance of records storage. Overall, this function is in the top third of the current function significance lineup.

Future Role. (X_m=8.0) In the future, this function will be in the top 25 percent most significance functions (see page 57). The plot again indicates an 88 percent in the majority, but the future IQR covers half the range of the current plot. This means consensus is greater about the future significance of this function. The person who rated it at 9 said, "We can't afford to stay with the old way of doing business." The person who rated it at 5 said this function will "not necessarily be an IRM role, but may be performed at the unit level." In any event, the group thinks this function will become more significant in the future.

Function K.

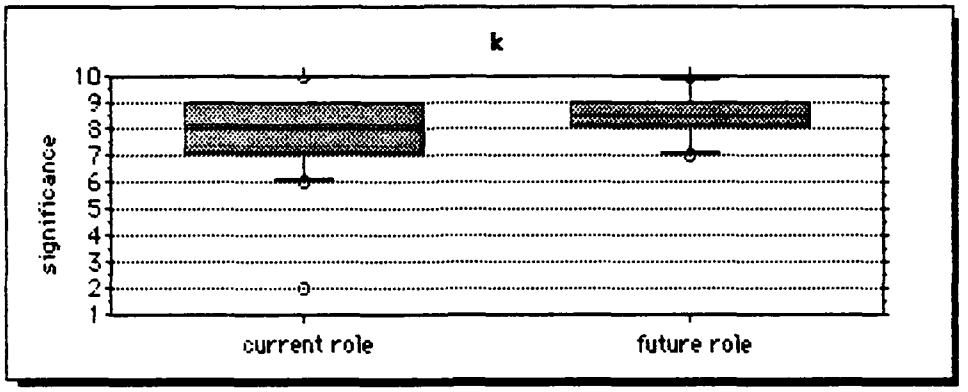


Figure 11. Advising the commander on IM and customer service matters

Current Role. (X_m=8.0) This plot is almost symmetrical along its median axis of 8.5 with an 81+ percent majority agreeing that keeping the commander advised of IM and customer service matters is highly important. Ten participants rated this function as 8 or 9 and three gave it a 7. The person who gave it a 10 commented, "Any IM in [any MAJCOM] who has not already established [his or herself] as the commander's information consultant needs to be worrying about employment."

Future Role. (X_m=8.5) The group indicated greater importance for this function in the future. The rating of 7 included the comment, "Customer service will not be our primary function; managing information will. Areas in which we will serve customers will decrease." Along with the two 10 ratings were comments like, "declining budgets will impact the type of services that can be provided," and "the IM will have to advise and help the commander know what alternatives exist for meeting customer needs." The group rated this as the second most significant future function.

Function L.

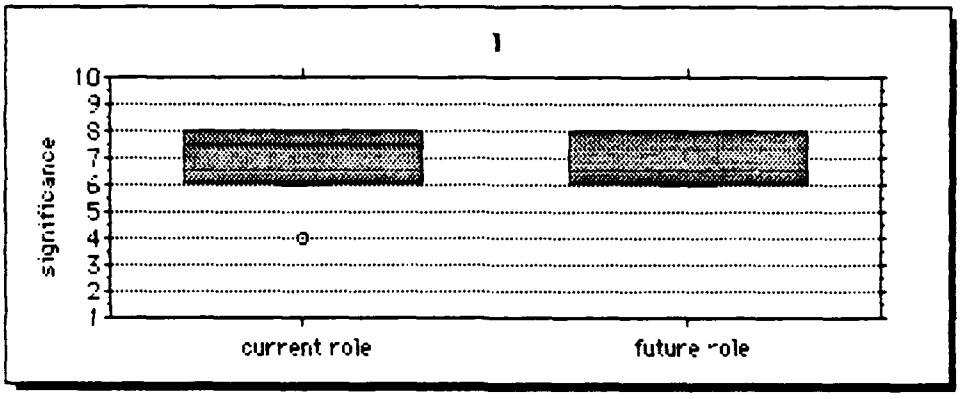


Figure 12. Control creation and use of reports, forms, correspondence, directives, and related records

Current Role. (X_m=7.5) This is the fourth most significant function in the role of a base-level IRM graduate, as indicated by 15 of the 16 participants, who rated it as a 6, 7, or 8. Half the respondents rated it as 8. Comments indicated the creation and use of reports and forms were the more important concepts in this function.

Future Role. (X_m=8.0) This is one of eight future role functions given a median rating of 8. It falls in the lower half of the order of significance for those functions and at the 40-percentile order of significance among all future functions (see page 57). What is most interesting about this plot is that 100 percent of all the participants form the majority opinion which has a range of 2 (from 6 to 8). Though no comments accompanied any of the ratings, and the concepts within the function cover a wide area, the historical strength of Delphi forecasting indicates this function will remain fairly significant in the future.

Function M.

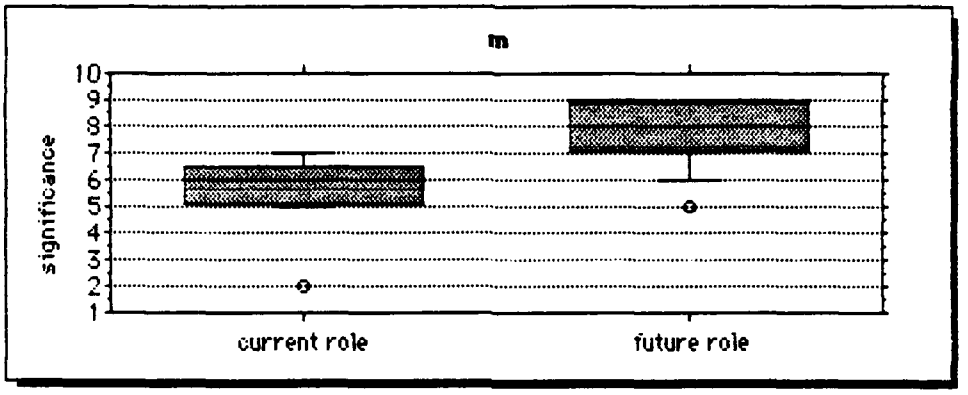


Figure 13. Streamlining and simplifying forms, or revising, eliminating, or combining forms

Current Role. (X_m=6.0) The 2 rating is from a participant who does "not perform this function," and can be momentarily disregarded. More than 81 percent of the group comprise the majority opinion that forms management has only moderate significance in the current roles of IRM graduates at base level. One 7 rating comment explained that this function for base-level IRMs "at the five technical training center (TTC) bases" would have a greater level of significance because of the preponderance of specialized forms the TTCs generate and therefore must manage.

Future Role. (X_m=8.0) More than 81 percent of the group think the importance of this function will increase significantly in the future with nine persons giving it an 8 or 9 and four rating it as 7. The dissenting comment that accompanied the rating of 5 was that "the major air command IMs will probably consolidate this function in the future." Nevertheless, the overwhelming consensus is that this function will increase in importance for base-level IRM graduates by the year 1996.

Function N.

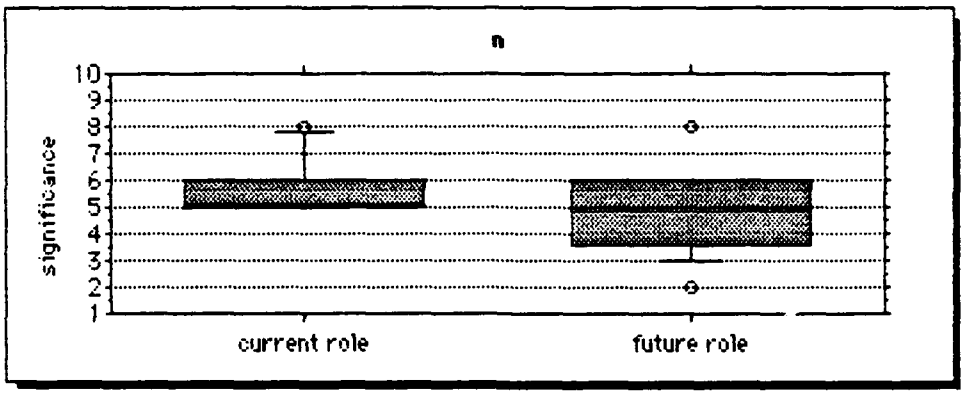


Figure 14. Additional duties (permanent functions) not within the realm of information management

Current Role. (X_m=5.0) Additional duties are those assigned to an individual in an organization on a "permanent" basis, such as unit security manager or morale officer, and which have nothing to do with information management. The group of participants formed a tight, 88-percent majority opinion that duties of this nature are relatively significant in the role of an IRM graduate at base level. However, one 8-rating comment said, "Base IMs still seem to be the dumping ground for additional duties."

Future Role. (X_m=5.0) Although the plot indicates the majority believe the significance of additional duties might decrease in the future, disagreement as to the extent of the decrease keeps the median significance projection constant. In the words of the respondent who rated the future function significance as an 8, "additional duties will always be a part of life" for base-level IRM graduates. This is an interesting comment in light of the unchanged median of the function's current and future importance.

Function Q.

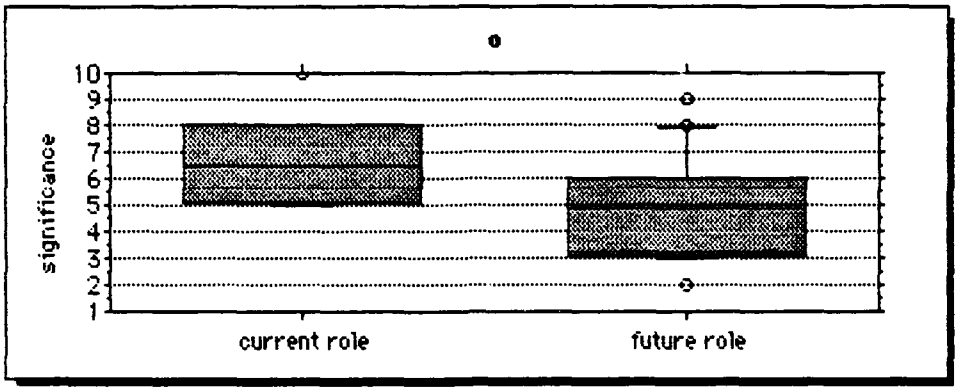


Figure 15. Temporary duties (details, taskings) not within the realm of information management

Current Role. (X_m=6.5) Temporary duties are assigned on a one-time or rotational basis. These duties include unit Combined Federal Campaign project manager or leader of a retirement parade; they have nothing to do with information management. The 10 rating came with no explanation. Otherwise, 15 of 16 participants formed the majority opinion that temporary duties are fairly significant in the roles of IRM graduates assigned to base-level jobs.

Future Role. (X_m=5.0) Seventy-five percent of the ratings formed the majority opinion that temporary duties would decrease in importance in the future. However, comments from the higher raters of 7, 8, and 9 indicate that, "because of (current) reductions in manpower," and the "fact that proven performers are usually more frequently tasked," temporary duty "responsibilities will probably increase." These comments may point to actual differences that may exist in the future for individual IRM graduates in varying situations.

Function P.

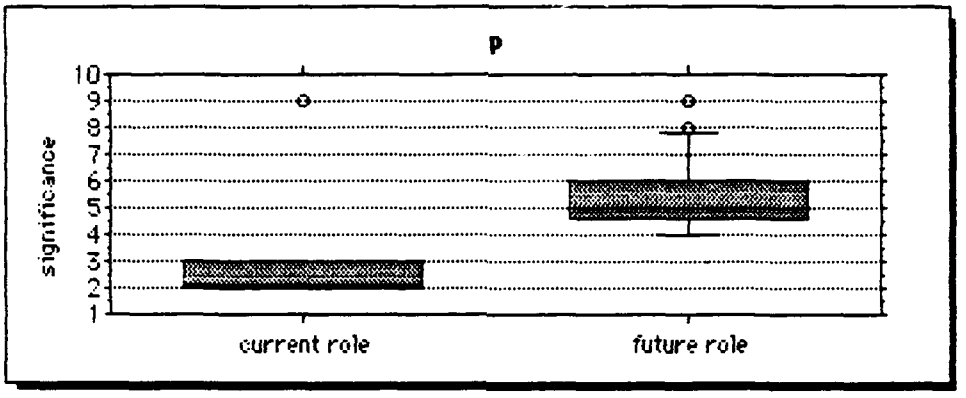


Figure 16. Apply descriptive and inferential statistics to analyze IM problems and make decisions

Current Role. (X_m=2.0) Ninety-four percent of the respondents rated the use of statistics in IM problem solving and decision making as almost insignificant. The comment which accompanied the 9 rating was, "Now more than ever we need to be developing good reasons for the actions we are taking," which seems to imply the rater was thinking of what IRM graduates at base level should be doing instead of what they are doing. The plot clearly shows that statistical use is largely insignificant among graduates.

Future Role. (X_m=5.0) Seventy-four percent of the ratings comprise the majority opinion of the future of this function, and another 25 percent of the ratings project a greater increase in the function's significance. The comment from the 9 rater seems to summarize the overall indication of this plot: "Statistical process control is one of the smartest ways we have to monitor and manage what we do. It is a skill that needs to be employed." The median future significance of this function is an extreme increase (+3) over the current role median.

Function Q.

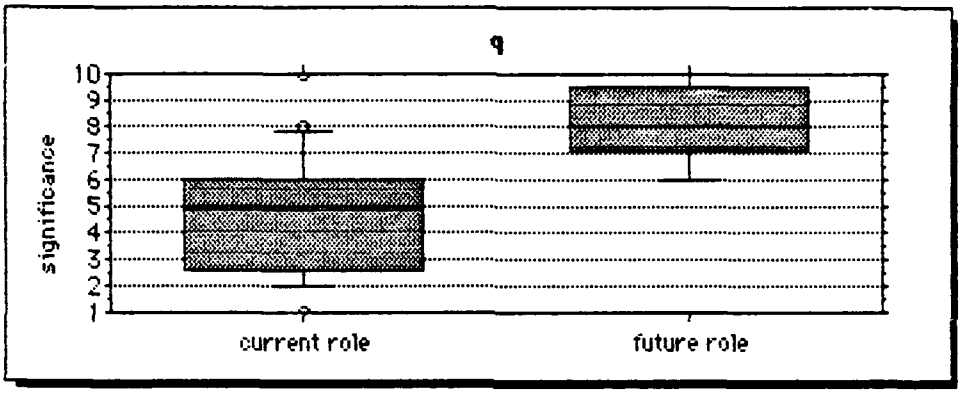


Figure 17. Conduct IM systems analysis and make design decisions

Current Role. (X_m=5.0) This received the fourth lowest significance of the 20 current functions. The rater who gave it a 10 offered no explanation, and the 8-rater said, "I am currently doing analysis and *design for several small systems." Discounting these two ratings would* indicate the median significance of this function should actually plot out somewhat lower than shown. However, 75 percent of the respondents, demonstrating a wide range of opinion, rate this function as only moderately significant in current roles.

Future Role. (X_m=8.0) There is an extreme increase (+3) in the median forecasted significance of IM systems analysis and design, and the group demonstrates a 69-percent majority opinion concerning the future function while the reamining 31 percent of the respondents are within one rating of the majority. The projected median importance of this function gives it a high level of significance by the year 1996.

Function R.

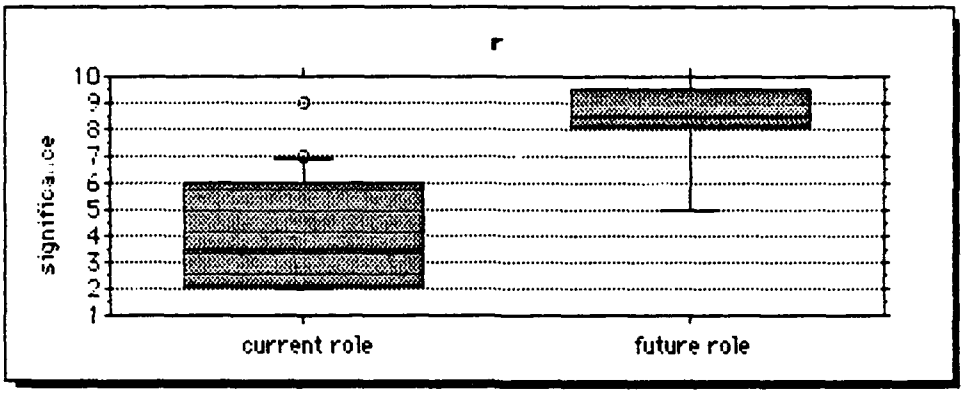


Figure 18. Apply computer-based applications to support management decision making

Current Role. (X_m=3.5) Computer-based application to management decision making support ranks, according to participant consensus, just above the bottom function performed by an IRM graduate assigned to a base-level position. Six of the respondents gave it a 2 and two gave it a 3. The IQR represents an almost 88 percent majority opinion. No explanation was offerred for either the 9 or 7 rating.

Future Role. (X_m=8.5) A median future significance of 8.5 is an extreme increase and the greatest increase in projected importance of any function in the twenty explored in this research. None of the three persons rating this future function gave a reason for their low minority opinions. The majority opinion of 69 percent has a fairly narrow range and four responses rated the function's significance above the majority with a 10, though no explanations were provided. Though comments about the ratings of this function were absent, a large majority, narrow IQR, and high median make this the third most significant future function.

Function S.

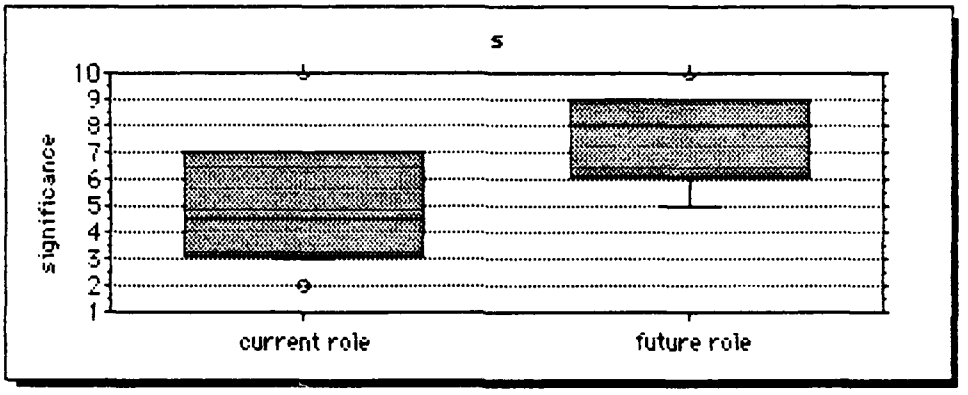


Figure 19. Use economic analysis and financial management for acquiring and controlling resources

Current Role. (X_m=4.5) Though third from the bottom in terms of role significance, economic analysis and financial management for resource management drew a wide range of ratings from the respondents. In the 88-percent majority, respondents were evenly spread over ratings of 7, 6, 5, 4, and 3. Neither the 1 nor the 10 came with a reason for the extreme rating, but serve to illustrate the divergence of opinion concerning the current significance of this function.

Future Role. (X_m=8.0) This function has the second highest increase in median significance and a 75-percent majority opinion. The person who rated this function as a 10 said, "The bottom line to every decision we make in the future can be expected to raise the issue of money. The (IM) who can't $ prove his good ideas won't get the $s needed to perform them." The IQR and median of the plot project this function as one of the more significant functions in the future role of an IRM graduate in a base-level role.

Function T.

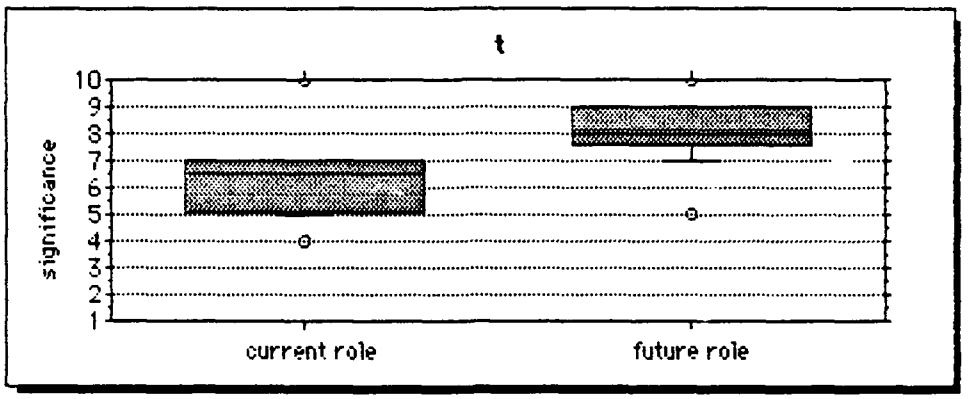


Figure 20. Conduct or coordinate training for IM specialists

Current Role. (X_m=6.5) A base-level IRM graduate's current involvement in the training of information management specialists is considered by the group of respondents to be of moderate importance. One rater gave it a 10 saying, "Training is the key to making the system work," and the rater who gave it a 4 said "training for 702s (enlisted IM specialists) is outside my branch." Seven participants gave it a 7, three gave it a 6, and four gave it a 5 rating. The IQR is formed by 88 percent of the respondents, and with a range of 2 this projection is considered to have a good degree of current significance representation.

Future Role. (X_m=8.0) The two circles represent the minority ratings of the two commenters above and the majority essentially stayed together and moved the median significance of IM specialist training up for the future. Six participants gave this function a 9, five gave it an 8, and three gave it a seven rating. This function is at the 80th percentile of all future functions in terms of projected role significance for IRM graduates assigned to base-level roles.

Order of Significance of Functions

All Function Data. Table 1 lists all functions in their descending order of rated significance as an initial, consolidated view of the group's opinions. For example, future functions A and K both have an 8.5 median rating and IQR of 1, but A's IQR has an 81-percent majority. Therefore, function A is forecast to be the most significant in the near future. The current and future function statements are listed their in descending order of significance on the next two pages.

Table 1. Rated Significance of Current and Future Role Functions

CURRENT				FUTURE			
∫	Xm	IQR	IQR%	∫	Xm	IQR	IQR%
F	8.00	1.00	0.88	A	8.50	1.00	0.81
I	8.00	2.00	0.81	K	8.50	1.00	0.75
K	8.00	2.00	0.81	R	8.50	1.50	0.69
L	7.50	2.00	0.94	F	8.00	0.00	0.81
A	7.00	1.50	0.75	J	8.00	1.00	0.88
J	7.00	2.00	0.88	C	8.00	1.00	0.75
D	7.00	2.00	0.69	T	8.00	1.50	0.75
E	6.50	2.00	0.94	L	8.00	2.00	1.00
T	6.50	2.00	0.88	B	8.00	2.00	0.88
G	6.50	2.00	0.81	M	8.00	2.00	0.81
O	6.50	3.00	0.94	Q	8.00	2.50	0.69
B	6.50	3.00	0.81	S	8.00	3.00	0.75
M	6.00	1.50	0.81	E	6.50	1.50	0.75
H	6.00	3.00	0.75	D	6.50	3.00	0.75
N	5.00	1.00	0.88	P	5.00	1.50	0.75
C	5.00	1.00	0.63	N	5.00	2.50	0.75
Q	5.00	3.50	0.69	H	5.00	2.50	0.69
S	4.50	4.00	0.88	O	5.00	3.00	0.75
R	3.50	4.00	0.88	G	3.00	3.00	0.69
P	2.00	1.00	0.94	I	3.00	3.50	0.69

LEGEND: The "∫" column is the letter of each function. "Xm" is the median rating. "IQR" is the range of majority opinion. "IQR %" is the percentage of participants who form the majority.

Current Function Statements.

Table 2. Current Function Statements in Order of Significance

F	Official mail and message processing
I	Printing, duplicating, and reprographics services
K	Advising the commander on IM and customer service matters
L	Control creation and use of reports, forms, correspondence, directives, and related records
A	Assessing capabilities, establishing priorities, and formulating IM plans and programs
J	Records retrieval, synthesis, miniaturization, storage, and disposition
D	Directing IM specialists in managing publications and forms
E	Document security and transmission
T	Conduct or coordinate training for IM specialists
G	Composing and authenticating special orders
O	Temporary duties (details, taskings) not within the realm of information management
B	Analyzing IM functions for trends in production, use, quality, and propriety of services
M	Streamlining and simplifying forms, or revising, eliminating or combining forms
H	Maintenance of the master publications library
N	Additional duties (permanent functions) not within the realm of information management
C	Programming automation of high volume, repetitive operations to increase productivity
Q	* Conduct IM systems analysis and make design decisions
S	* Use economic analysis and financial management for acquiring and controlling resources
R	* Apply computer-based applications to support management decision making
P	* Apply descriptive and inferential statistics to analyze IM problems and make decisions

Function statements preceded by an asterick (*) are AFIT IRM program curriculum objectives (13). All other function statements are from the IM Officer Specialty Summaries (12) except temporary and additional duties.

Future Function Statements.

Table 3. Future Function Statements in Order of Significance

A	-	Assessing capabilities, establishing priorities, and formulating IM plans and programs
K	-	Advising the commander on IM and customer service matters
R	*	Apply computer-based applications to support management decision making
F	-	Official mail and message processing
J	-	Records retrieval, synthesis, miniaturization, storage, and disposition
C	-	Programming automation of high volume, repetitive operations to increase productivity
T	-	Conduct or coordinate training for IM specialists
L	-	Control creation and use of reports, forms, correspondence, directives, and related records
B	-	Analyzing IM functions for trends in production, use, quality, and propriety of services
M	-	Streamlining and simplifying forms, or revising, eliminating or combining forms
Q	*	Conduct IM systems analysis and make design decisions
S	*	Use economic analysis and financial management for acquiring and controlling resources
E	-	Document security and transmission
D	-	Directing IM specialists in managing publications and forms
P	*	Apply descriptive and inferential statistics to analyze IM problems and make decisions
N	-	Additional duties (permanent functions) not within the realm of information management
H	-	Maintenance of the master publications library
O	-	Temporary duties (details, taskings) not within the realm of information management
G	-	Composing and authenticating special orders
I	-	Printing, duplicating, and reprographics services

Function statements preceded by an asterick (*) are AFIT IRM program curriculum objectives (13). All other function statements are from the IM Officer Specialty Summaries (12) except temporary and additional duties.

Meaning of Significance Ratings. The participants' combined ratings of current and future role functions fall into significance groupings defined by median significance rating (Xm) and the level of consensus among the majority about that significance (IQR; a lower number is greater consensus). Table 1 on contains the complete list. For this discussion, the significance groupings are assigned the descriptive terms shown in Table 4.

Table 4. Descriptive Terms for Median Significance Ratings of Functions

Median Rating (Xm)	Range of Majority Opinion (IQR)	Descriptive Term
8.50	1.00 - 1.50	Exceptional Significance
8.00	0.00 - 1.50	Very Highly Significant
	2.00 - 2.50	Highly Significant
7.00 - 7.50	1.50 - 2.00	Fair Significance
6.50	1.50 - 3.00	Average Significance
6.00	1.50 - 3.00	Below Average Significance
5.00	1.00 - 3.50	Low Significance
Below 5.00	1.00 - 4.00	Fairly Insignificant

Significance of Current Functions. Participants almost unanimously view official mail and message processing as the most significant function in the current role of IRM graduates assigned to base-level positions. Other highly significant functions include operation of the base printing and reprographics plant and keeping the commander (in current roles, participants interpret this as the immediate supervisor) advised of internal Base IM and customer service matters. According to the experts, moving the mail, making copies, and keeping the boss informed, particularly

with regard to these customer services, are the most important role functions IRM graduates perform in their base-level positions today.

Fairly significant functions in the role of a base-level IRM graduate include the physical management of printed publications and forms, making IM plans and establishing programs and priorities, and supervising the people who manage physical records storage and disposition. Functions of average significance include document security, IM specialist training, managing special orders, temporary duties outside the realm of information management, and analyzing IM customer service trends. The experts think additional duties outside the realm of IM and automating repetitive operations are functions of below-average significance.

Of all the above functions, only one of the two below-average-significance functions (automating repetitive operations to increase productivity) begins to make use of base-level IRM graduates' technical management expertise. In spite of the fact they are assigned to positions which are coded in the personnel database as requiring an officer with a graduate IRM degree, the experts think those functions which reflect IRM program objectives have little or no significance in the roles of IRM graduates in base-level positions. It is clear, however, that the research participants, especially those currently serving in base-level positions, do not think the order of significance of these current roles functions is appropriate today, much less five years from now.

Significance of Future Functions. Although the set of function statements is the same for both current and future roles, the participants' comments in the round-two survey indicate their expectation that these function statements will take on new characteristics in the future. The

anticipated change in nature of some of the future function statements arises from the research group's belief that future functions will implement technological information management applications being planned today. These changes in future function characteristics are discussed below.

The participants think three functions should have exceptional significance for IRM graduates at base level by 1996: assessing capabilities, establishing priorities, and formulating IM plans and programs; advising the commander (in future roles, this includes senior installation commanders) on information management matters; and applying computer-based applications to support management decision making. According to the experts, the greatest need in the future at base level is an IRM graduate who communicates directly with senior leadership to formulate plans and programs which incorporate the use of computer-oriented information management as a strategic organizational resource.

Although IM plans and programs and advising the commander increase in forecast future significance, the most radical change in significance of any function is that of computer-based applications which support decision making. This function is projected to rise dramatically from insignificance in the current role to exceptional significance in the near future, and is key to the highest significance grouping of future role functions.

The Delphi panel thinks four functions should be very highly significant in the future roles of IRM graduates at base level and indicated that the character of these functions needs to evolve from a manual to an electronic operation: official mail and message processing; records storage and disposition; programming automation of repetitive operations to increase productivity; and training for IM specialists. The participants

projected several functions as highly significant in the future, functions which will evolve electronic computer systems characteristics: controlling and using publications and forms; analyzing IM functions for trends in use, quality, and propriety of services; conducting IM systems analysis and making design decisions; and using economic analysis and financial management for acquiring and controlling resources.

Some of the highly to exceptionally significant functions owe their standing in the order of significance to the research panel's belief that they simply need to be more significant in the future. Most of these ratings reflect the panel's expectation that new computer-based information management applications and the increasing availability of other more sophisticated IM resources will change the nature of these functions and hence, their level of role significance. On the other hand, new technology is expected to decrease the significance of some functions in the future.

Document transmission and security, in addition to directing IM specialists in managing publications and forms are expected to decrease to average significance in the future for base-level IRM graduates because the participants expect that information networks will enable users to perform these functions themselves with on-line resources. The reason also applies to the decrease to relative insignificance of the functions of maintaining the master publications library and the creation of special orders.

The use of statistics for problem solving and decision making receives only a moderate increase in significance in the future for the base-level IRM graduate, a forecast probably influenced by the participants' awareness that current total quality management initiatives rely on the use of statistical analysis. Additional and temporary duties drew mixed ratings

of future significance from the group and lower levels of consensus, though overall these functions, according to the panel, need to be less significant in the future. Printing, duplicating, and reprographics are expected to be fairly insignificant in the future since this function may no longer fall within the role of base-level IRM graduates in the near future.

Resolving the Difference Between Current and Projected Roles

Part IV of the round-one survey asked participants to make "specific suggestions on what needs to happen to change from the current roles to the required future roles" they projected for IRM graduates assigned to base-level roles. (See page 83 of Appendix C) They were asked to number their recommendations in prioritized order. Their combined views formed six areas of recommendation which are presented below in their order of frequency of agreement among the participants–the area of greatest consensus is presented first. Within each recommendation area are the quoted and summarized suggestions of the group.

Senior Air Force Information Management Leadership. Of the 44 recommendations participants gave as necessary in order to transition to the required future role for IRM graduates at base level, 13 (30 percent) concern senior IM leadership. Five of the thirteen recommendations in this area were listed as a first priority.

In the combined opinion of the research participants, the single most important factor in transitioning from the current to the required future role for IRM graduates assigned to base-level positions is "a change in the attitudes of IM about itself and its mission." This transition must begin by replacing "the old-fashioned attitudes of senior IM leadership" with a "new

perspective of IM and view of the future." In conjunction with this change in outlook, the career field as a whole "needs direction from the top about where we should be headed to establish our roles." IM leadership should not "[wait] for other career fields' senior leaders to define IM policies."

Specific suggestions in this area for the Air Force Directorate of Information Management include "pro-active integration of IM plans with the rest of the Air Force," top-down "communication of the big-picture plans," involvement of "senior IM leadership in new technology," and aggressive promotion, funding, and implementation of an "IM messaging network, electronic records management, and the involvement of base IRMs in the design of IM systems and software."

The AFIT Information Resource Management Program. The AFIT IRM program drew nine (20 percent) of the total recommendations for needed change. Four of the nine were listed as a first priority.

The first general consensus in this area is that there should be more people in base-level positions with an IRM education, though a minority believe "70XXs should have base IM experience before" IRM studies. In either case, the overwhelming majority opinion of the group is the "IRM program must be tailored to 'real' Air Force needs."

In making specific suggestions for changes in the IRM program, the participants–all IRM graduates–focused on three areas of the program they believe need to be enhanced to help effect transition to the forecast role. They suggested the program "develop better writing skills," more in line with "Air Force, not AFIT writing," and that the program provide more education in "the base-level budgeting process. . .and economic analysis." By far the most frequent recommendations are to enhance the development of

"systems analysis skills for base-level applications" and to emphasize more strongly "technology to improve information flow to increase productivity." In short, the participants believe adapting the IRM curriculum so graduates can "get smarter about computers" and their applications at base level is necessary to help change from the current to the future base IRM role.

The IRM Graduate at Base Level. Seven (16 percent) of the experts' recommendations for effecting role change are actions the IRM graduate at base level can take directly. The graduate can begin by developing "a knowledge of the base's computer hardware and systems" and establishing "an office automation group." The graduate should "promote the use of electronic data communications" and become "more pro-active in information analysis services." As a result, he or she can "look for jobs to automate" now and in the future and will establish a new role "involved with developing information systems on the base." Eventually, the graduate will be able to initiate "the testing and development of base-level information technology, on-line services, etc."

Other specific suggestions in this area refer to the education of senior base commanders as to the graduate's capabilities. These are presented in the next section as a separate area of recommendation.

Education of Commanders. Six (14 percent) of the recommendations fell in this area which applies to all levels of Information Management. The Air Staff IM "must define, publish, and educate the Air Force in IM roles which point toward the future" and the ideal "purpose of IM." The MAJCOM IMs should "inform commanders of the qualifications of IRM graduates" as well as "emphasize to commanders what IM really does and what roles it should be doing in the future." The IRM graduates at base level should also

"educate commanders about information management ideas today," apprise "commanders of their capabilities," and do so by example and demonstration "rather than just talking about them."

Merger of IM with SC. Five (11 percent) suggestions for needed changes concerned merging IM and communications/computer systems (SC) organizations. The central theme here is that "the IM career field should merge with the Communications/Computer Systems career field. . .to become two sides of the same coin," and the recommendations go beyond the question of base-level IRM graduate roles. The participants provided specific, base-level comments like, "at base level, develop a working relationship with SC," or "the base IM should merge with the SC unit," or base-level IRMs should "get out from under the personnel world. . .and under the communications squadron commander." However, most of their ideas, which would also affect base-level IRM roles, were aimed at changing the highest organizational levels.

The group generally agreed it will be necessary to "change the IM organizational structure. . .to align IMs with computer managers for true information management." The research participants see the two-sided utility of an IM/SC consolidation as the effective and necessary merger of "developers (IM) and builders (SC)" to best serve Air Force users.

Changes in the 70XX Air Force Specialty Code. Four (9 percent) suggested changes for realizing the projected future roles of IRM graduates assigned to base-level roles constitute a small set of ideas concerned with the IM officer AFSC. The comment that "more rank in the career field" is needed [the highest IM officer grade currently authorized is O-6] implies that necessary future changes might be less difficult to effect if the career

field had a higher rank at the top. Other recommendations in this area complemented the idea of IM/SC merger: once IRM-oriented 70XXs had been absorbed by SC, the "staff support 70XXs (should become) 73XXs" [part of the personnel officer career field]. Finally, some participants think every effort should be made to "train more (officer and enlisted) IM personnel to be computer literate."

Analysis of Panel Change Recommendations. The research participants recommended changes they believe are necessary to resolve the difference between the current role they have described and the role they forecast. Their ideas are presented in order of frequency of agreement among the group; however, suggestions in the last areas should not be considered insignificant by virtue of their position in the consensus order.

1. Change the Direction of Air Force IM. Almost one-third of all the participants' recommendations express a view that Air Force Information Management is not what it could or should be and that changing it is primarily the responsibility of senior IM leadership. The research group, concerned with the base-level roles, and hence the lowest organizational level of assignment, of IRM graduates, views the most important changes affecting these graduates as ones which will affect the Air Force IM community as a whole, from the top down. New attitudes and perspectives, direction, involvement, communication, and leadership are called for by the experts to change the role of IRM graduates at base level to one that is needed not only now but moreso five years from now.

2. Graduates Should Have Experience as the Base IM. This second-most-frequent recommendation came from a group of 16, only six of whom have experience as a Base IM. The experts obviously think this

particular experience has practical value, wether before or after the IRM program. The group as a whole extols the value of the IRM education, though virtually all of them believe the program can be improved to help realize the role they have forecast for base-level graduates. In short, the experts assert that the IRM program and its curriculum should be refined to emphasize those things that will be of the greatest practical value to the graduates in the field.

3. Base-Level IRM Graduate Responsibility to Help Change. The experts acknowledge that the graduate should not sit back and wait for changes to flow down from above but should aggressively promote those functions that the experts think will be necessary in the future role. The IRM graduate at base level should join other IM leadership in educating commanders about what IM is, what it should be, and its value as a strategic resource on the installation.

4. Reorganizing the Structure of Information Management. The participants have various ideas which range from aligning IM with the communications/computer systems career (SC) field to splitting the IM career field into those officers who perform information resource management and those who perform executive support and administrative functions. The general trend of the experts' view in this change area is that somehow, IRM graduates should come out from under the organizational supervision of the personnel career field, rise from an organizational standing some three or four levels of supervision beneath the senior installation commander, be aligned more closely as IM developers with the SC builders, and be given the opportunity and mandate to apply their IRM expertise in a manner they believe will be required by 1996.

V. Conclusions and Recommendations

> The determination of a group of key information management issues by an influential segment of the community. . . fills a need for individuals and organizations making decisions about research, curriculum, professional programs, and activities. (14:145)

Conclusions

The research problem was to forecast the role AFIT Information Resource Management graduates assigned to base-level positions will need to fill by the year 1996. The research further sought to determine what changes are necessary to resolve the perceived differences between current and forecast roles for these graduates. The Delphi survey method of forecasting was selected as an effective method of discovering what role the graduates will need to fill five years from now. The primary rationale for this method was that it could provide a select group of knowledgeable individuals an opportunity to develop a concencus of opinion in regard to the general role and specific functions of an IRM graduate at base level. In addition, this method also enabled me to gather their ideas on what it will take to transition to the future role. Final conclusions to each of the three investigative questions are presented below.

Investigative Question One. The answer to the question "What roles are IRM graduates at base level filling now?" was intended to provide an initial baseline for measuring the significance of twenty functions the graduates are expected to perform in their roles at base level. As clearly indicated in Figures 1-20, Tables 1, 2, and 4, and in the subsequent discussion on pages 60-61, confirm McGhee's finding that IRM graduates

assigned to base-level jobs are performing roles which make no use of their graduate educations in information resource management.

IRM graduates in base-level jobs currently do not perform information systems analysis, design, development, or implementation; nor do they manage organizational information resources to facilitate performance; nor do they interact in any significant manner with other organizational functions to apply computer technology. These graduates are also equipped and expected to tackle other technical issues such as analyze IM problems with descriptive and inferential statistics, apply computer-based applications to support management decision making, and make information systems decisions, yet these functions are not part of their current roles.

Instead, the most significant current role functions of IRM graduates at base level are managing the physical movement of official mail on the base with vehicles and relatively unskilled labor; providing duplication and reproduction services in a small base printing shop; supervising the people who retrieve, store, and dispose of physical records; informing their immediate supervisor of internal Base IM and customer service matters; performing temporary details and other taskings which are outside the realm of IM; and directing IM specialists who manage printed publications and forms and those who physically manage special orders.

These graduates are responsible for "old style" base administration duties instead of being able to apply their up-to-date technical educations to managing automated information and its associated computer resources. These current base-level functions are important and must be performed, but IRM graduates who are assigned to manage them experience the

frustration of knowing their own potential for technological information resource management is going to waste in these roles.

Investigative Question Two. The question was, "What role will IRM graduates at base level need to fill five years from now?" The answer to this question is the definition of the role the experts think is needed by 1996, in terms of a prioritized order of the significance of each role function. Figures 1-20, Tables 1, 3, and 4, and the discussion on pages 61-64 indicate the experts' view that the role of the IRM graduate at base level needs to be changed from a collection of physical administrative support functions to a role in which the graduate is in a position to communicate directly with senior leadership to formulate plans and programs which incorporate the use of computer-based information management as a strategic organizational resource. The function which rises most dramatically from current insignificance to exceptional significance in the near future, and is considered key to effecting the required future role of these graduates, is the graduate's management of computer-based applications which directly support senior leadership decision making.

The experts agree that the nature of most of the functions which comprise the future role will change from manual to electronic. As new information resource technologies enter the organization, the need for change in the role of the IRM graduate at base level is greater for these functions which rise in significance in the future. Electronic mail, records transfer, repetitive operations programming, and needed training for IM specialists are all expected to become more computer-oriented and create a greater need for a base information resource manager. Other functions which the participants expect will evolve technologically will diminish the

need for the base-level IRM graduate to manage them since users will perform these functions for themselves: document transmission, access to publications and forms, special orders, and any other administrative functions which can be automated and conducted on line by the user.

Investigative Question Three. The question was, "What actions are required to resolve the differences between current and foreçast IRM graduate roles at base level?" The answer to this question is the means by which the experts think the change should be made and is detailed in the discussion on pages 64-69. The participants think the responsibility for effecting the necessary role changes for IRM graduates assigned to base-level positions, as well as for all other information managers, falls first and foremost to senior Air Force IM leadership, which must develop new approaches to transitioning the IM career field as a whole into the future.

The experts believe the AFIT IRM program can be improved to provide graduates with more practical skills they will need to apply in their base-level roles in the future, and they cite actions which the graduate can take at base level to help effect transition to the roles the participants cited as necessary five years from now. IRM graduates at base level can join senior IM leadership and other IM officers at intermediate levels in educating commanders about the qualifications of IRM graduates, what role IM should have in the future, and how IM can best meet their needs. Other ideas for transitioning to the future role include a closer alignment with the base communications/computer systems organization and reorganizing the IM career field to distinguish between IRM officers and those who provide executive and other administrative support.

Recommendations

The findings of this research indicate there is a great difference between the roles IRM graduates perform at base level now and the role the research participants think these graduates should be performing five years from now. In support of resolving this difference, the following recommendations are offered.

For IM Leadership. It is interesting that the Air Force Directorate of Information Management, which requested this study, is the entity to which the experts look for solutions to the problems of implementing the future role deemed necessary for base-level IRM graduates in 1996. SAF/AAI should review this study and incorporate its findings in its planning of role definitions for information management officers at base and higher levels. SAF/AAI should also specify IM's current and projected relationship with the SC community. Finally, SAF/AAI should establish a recurring publication aimed at educating commanders at all levels and keeping IMs in the field informed of current and planned IM endeavors with a specific forum within it for the exchange of ideas.

This study or portions of it should be forwarded to MAJCOM Directors of Information Management for their edification and use in applying at the MAJCOM level those suggestions the experts have made. MAJCOM IMs may wish to conduct more specific study among their command information managers to determine what opinions or suggestions in this area may be unique in their command and how their research results may be similar to or different from this research group's overall view. MAJCOM IMs should also reiterate the findings of this research to their base-level IMs in the form of a view of where those base-level jobs are headed in the near future.

Participants in the reasearch, who were provided with the results of the round-two survey, and who are assigned to either base or MAJCOM-level positions, should review the combined function ratings and suggestions for change of their fellow panelists to enlarge their own points of view on the types of roles they and other IRM graduates either at base level or above should expect to need to fill by 1996.

For Future Research. Research which examines and compares the views of senior commanders and IM leaders as to the significance and utility of information resources now and in the near future might provide insight into any discrepancies that exist between the opinions and expectations of the IM community and senior commanders. This type of research could provide a starting point for both groups to develop consensus on exactly how the future IM role should develop.

Senior commanders' views on what role IM should play in the future can be compared to what resources exist for fulfilling this role, what levels of expertise exist for implementing those expectations, and how functions and responsibilities should be assigned. These research suggestions can be applied at Air Force, MAJCOM, or any organizational level. An investigation into any of these research areas can provide useful information for the IM community and commanders about how information resource management can best serve the needs of the Air Force.

Appendix A: AFIT IRM Curriculum from 1989 to 1991

Department & Course No.	Complete Course Title	Hours
Acquisition Management		
AMGT 520	Managerial Economics I	3
602	Federal Financial Management	3
Contracting Management		
CMGT 523	Contracting and Acquisition Management	3
Communications		
COMM 310	Fundamentals of Written Communications	2
630	Research Methods	2
687	Theory and Practice of Professional Communications	3
799	Independent Study–Thesis	9
Information Resource Management		
IMGT 560	Computer Systems Concepts	3
561	Applications for Database Management Systems	4
630	Concept Foundations of Information Systems	3
651	Systems Analysis and Design	3
653	*Information Resource Management Colloqium*	0
654	Information Systems Policy	3
657	Information Systems Technology	3
658	Local Area Networks	3
Logistics Management		
LOGM 510	Microcomputer Applications for Managers	3
615	Logistics of Decision Support Systems	3
Mathematics		
MATH 525	Applied Statistics for Managers I	3
535	Applied Statistics for Managers II	3
Operational Research		
OPER 562	Quantitative Decision Making	4
Organizational Sciences		
ORSC 542	Management and Behavior in Organizations	4
626	Organizational Development	3
Systems Management		
SMGT 646	Project Management	3
	Total (including 6 non-credit hours):	79

RANK	TAFMS	# YEARS AS 70XX	CURRENT MAJCOM	# YEARS CURRENT POSITION	CURRENT AFSC	CURRENT LEVEL ASGND	# YEARS AT BASE LEVEL	# YEARS AS BASE IM
MAJOR	17	13	TAC	1.5	7046	MAJCOM	1.5	-
CAPT	17	17	ATC	1.5	7034	WG/BASE	4.5	1.5
CAPT	15	11	AFCC	1	7034	MAJCOM	4.5	1.5
CAPT	15	3	ATC	0.5	7034	WG/BASE	2.5	0.5
CAPT	11	11	MAC	0.5	C7031	MAJCOM	4.5	-
CAPT	11	9	TAC	1	7041	WG/BASE	4.5	-
CAPT	11	5	TAC	1.5	7034	WG/BASE	4.5	1.5
CAPT	9	7	AFLC	2.5	7034	MAJCOM	2.5	-
CAPT	7	7	ATC	1.5	7034	MAJCOM	2.5	-
CAPT	7	3	TAC	0.5	7034	MAJCOM	1.5	-
CAPT	5	5	ATC	0.5	7034	MAJCOM	2.5	2.5
CAPT	5	5	ESC	0.5	7031	MAJCOM	3.5	-
CAPT	5	5	AU	1.5	7034	WG/BASE	4.5	-
CAPT	5	5	AFSC	1.5	7034	WG/BASE	3.5	-
CAPT	5	5	MAC	1.5	7034	WG/BASE	1.5	1.5
1LT	5	5	SAC	0.5	7041	MAJCOM	-	-
Averages:	**9.38**	**7.25**		**1.13**			**3.23**	**1.50**

Table 5. Demographic Data on Research Participants

Appendix C: Round-One Research Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C. 20330

17 APR 19

REPLY TO ATTN OF: SAF/AAI

SUBJECT: Roles of AFIT IRM Graduates in Base-Level Positions

TO: Survey Participant

1. At our request, Major Dave Block is conducting thesis research on the utilization of IRM graduates in base-level positions.

2. Major Block is using the Delphi survey method to identify roles AFIT IRM graduates assigned to base-level positions will need to perform five years from now. This is the first of two surveys you will be asked to complete. If found to be significant, the data gathered from survey responses could influence future job design and assignment considerations for IRM graduates.

3. Your individual response will be combined with others and will not be attributed to you personally. Your participation in the survey is voluntary, but we hope you will take the time to be part of this important research. We would appreciate receiving your response by 10 May 91.

4. If you have questions, please contact Dr. Freda Stohrer, DSN 785-2820. Thank you.

Edward A. Pardini

EDWARD A. PARDINI, Colonel, USAF
Director of Information Management

2 Atch
1. Questionnaire
2. Return Envelope

First Round (of Two)

Part I. This section asks for background information. Answers to these questions provide demographic information about survey participants.

Instructions: Please fill in the blanks or check the appropriate box.

Please devise a personal code using a maximum of seven alphanumerics that only you would recognize as your own. For example: 0 B 1 K N 0 B. This is strictly for the purpose of enabling the researcher to align the first and second questionnaires from each survey participant.

_ _ _ _ _ _ _

Important: please make a note of your code and use it on the second-round survey as well.

1. What is your current rank?

   ☐ 2Lt ☐ 1Lt ☐ Capt ☐ Major ☐ Lt Col ☐ Colonel

2. How many years of active military service do you have?

   ☐ Less than 2 years
   ☐ 2 years but less than 4 years
   ☐ 4 years but less than 6 years
   ☐ 6 years but less than 8 years
   ☐ 8 years but less than 10 years
   ☐ 10 years but less than 12 years
   ☐ 12 years but less than 14 years
   ☐ 14 years but less than 16 years
   ☐ more than 16 years

3. How many total years of job experience in the 70XX AFSC do you have?

   ☐ Less than 2 years
   ☐ 2 years but less than 4 years
   ☐ 4 years but less than 6 years
   ☐ 6 years but less than 8 years
   ☐ 8 years but less than 10 years
   ☐ 10 years but less than 12 years
   ☐ 12 years but less than 14 years
   ☐ 14 years but less than 16 years
   ☐ 16 years or more

4. To which major command are you assigned?

   _____

5. What is your duty title?

_____

6. How long have you been assigned to your current position?

- ☐ Less than 6 months
- ☐ 6 months but less than 1 year
- ☐ 1 year but less than 2 years
- ☐ 2 years but less than 3 years
- ☐ 3 years but less than 4 years
- ☐ 4 years or more

7. What is your current AFSC?

☐ 7024 ☐ 7034 ☐ 7016 ☐ 7046 ☐ _____

8. At what level of information management function are you assigned?

☐ Wing/base ☐ Air division or numbered air force ☐ MAJCOM

9. Have you had 70XX experience at wing/base level (includes squadron)?

☐ yes ☐ no

10. If your answer to 9. was yes, how much? (☐ n/a)

- ☐ Less than 6 months
- ☐ 6 months but less than 1 year
- ☐ 1 year but less than 2 years
- ☐ 2 years but less than 3 years
- ☐ 3 years but less than 4 years
- ☐ 4 years or more

11. Have you had experience as a Chief, Base Information Management?

☐ yes ☐ no

12. If your answer to 11. was yes, how much? (☐ n/a)

- ☐ Less than 6 months
- ☐ 6 months but less than 1 year
- ☐ 1 year but less than 2 years
- ☐ 2 years but less than 3 years
- ☐ 3 years but less than 4 years
- ☐ 4 years or more

Part II. Current roles of IRM grads assigned to base-level jobs. These IM function statements represent the combined descriptors of the Information Management Officer Specialty Summaries and the AFIT School of Systems and Logistics IRM program objectives.

Instructions (please read carefully):

1. Please check the numerical weight of your degree of "expertness" in answering questions in this part of the survey. "On a scale from 1 (low) to 10 (high), the amount I know about the **current** roles of IRM grads assigned to base-level positions is":

(low) ☐1.....☐2.....☐3.....☐4.....☐5.....☐6.....☐7.....☐8.....☐9.....☐10 (high)

2. Please rate the significance of each of the following **current** functions in the roles of IRM grads assigned to base-level jobs (ie: how big a part of the job is this function?). Enter one number from 1 thru 10 in each blank. Add any functions you think are missing in the blanks below.

(insignificant) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 (extremely significant)

a ___ Assessing capabilities, establishing priorities, and formulating IM plans and programs.

b ___ Analyzing IM functions for trends in production, use, quality, and propriety of services.

c ___ Programming automation of high volume, repetitive operations to increase productivity.

d ___ Directing IM specialists in managing publications and forms.

e ___ Document security and transmission.

f ___ Official mail and message processing.

g ___ Composing and authenticating special orders.

h ___ Maintenance of the master publications library.

i ___ Printing, duplicating, and reprographics services.

j ___ Records retrieval, synthesis, miniaturization, storage, and disposition.

k ___ Advising the commander on IM and customer service matters.

l ___ Control creation and use of reports, forms, correspondence, directives, and related records.

m ___ Streamlining and simplifying forms, or revising, eliminating or combining forms.

n ___ Additional duties (permanent functions) not within the realm of information management.

o ___ Temporary duties (details, taskings) not within the realm of information management.

p ___ Apply descriptive and inferential statistics to analyze IM problems and make decisions.

q ___ Conduct IM systems analysis and make design decisions.

r ___ Apply computer-based applications to support management decision making.

s ___ Use economic analysis and financial management for acquiring and controlling resources.

t ___ Conduct or coordinate training for IM specialists.

u ___ _____

v ___ _____

w ___ _____

Part III. Future roles of IRM grads assigned to base-level jobs. This is a restatement of the combined descriptors of the IM Officer Specialty Summaries and the AFIT/LS IRM program objectives in Part II. The future role referred to is projected for five years from now.

Instructions (please read carefully):

a. Please check the numerical weight of your degree of "expertness" in answering questions in this part of the survey. "On a scale from 1 (low) to 10 (high), my degree of expertness about the required **future** roles of IRM grads assigned to base-level positions is":

(low) ☐1.....☐2.....☐3.....☐4.....☐5.....☐6.....☐7.....☐8.....☐9.....☐10 (high)

b. Please rate the significance of each of the following **future** functions in the roles of IRM grads assigned to base-level jobs (ie: how big a part of the job will this function need to be in five years?). *Enter one rating in each blank. Add additional functions in the blanks below.*

(*insignificant*) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 (extremely significant)

a ___ Assessing capabilities, establishing priorities, and formulating IM plans and programs.

b ___ *Analyzing IM functions for trends in production, use, quality, and propriety of services.*

c ___ Programming automation of high volume, repetitive operations to increase productivity.

d ___ Directing IM specialists in managing publications and forms.

e ___ Document security and transmission.

f ___ *Official mail and message processing.*

g ___ Composing and authenticating specific orders.

h ___ Maintenance of the master publications library.

i ___ Printing, duplicating, and reprographics services.

j ___ *Records retrieval, synthesis, miniaturization, storage, and disposition.*

k ___ Advising the commander on IM and customer service matters.

l ___ Control creation and use of reports, forms, correspondence, directives, and related records.

m ___ Streamlining and simplifying forms, or revising, eliminating or combining forms.

n ___ *Additional duties (permanent functions) not within the realm of information management.*

o ___ Temporary duties (details, taskings) not within the realm of information management.

p ___ Apply descriptive and inferential statistics to analyze IM problems and make decisions.

q ___ Conduct IM systems analysis and make design decisions.

r ___ Apply computer-based applications to *support management decision making.*

s ___ Use economic analysis and financial management for acquiring and controlling resources.

t ___ Conduct or coordinate training for IM specialists.

u ___ _____

v ___ _____

w ___ _____

Part IV. Resolving the difference between current and future roles. This section seeks your narrative opinion of what specific changes are necessary to resolve the differences between the current and required future roles you have projected for IRM graduates assigned to base-level positions. This may be the most critical portion of this survey.

Instructions: Please take a moment to compare your rankings in Parts II and III. **Note**: Your recommendations should not address the individual elements in Parts II and III, but should be specific suggestions on what needs to happen to change from the current roles to the required future roles. Please number your recommendations in order of significance, 1 the most important, etc.

a. What specific steps need to be taken to resolve the differences between the current and required future roles for IRM grads assigned to base-level positions?

b. Do you have any other comments which you feel might assist in this research?

Thank you for your help!

Please return this questionnaire in the envelope provided to:

Major David O. Block, AFIT/LSG, WPAFB OH 45433.

(Please be sure to record your personal identification code for use on your second questionnaire!)

Appendix D: Round-Two Research Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C. 20330

17 APR 199[illegible]

REPLY TO ATTN OF: SAF/AAI

SUBJECT: Roles of AFIT IRM Graduates in Base-Level Positions

TO: Survey Participant

1. Thank you for your timely response to the first survey. Major Block used your initial response to formulate the final questionnaire, which is attached.

2. We hope you will take the time to complete this final survey to help us determine what roles AFIT IRM graduates assigned to base-level positions will need to perform five years from now. If found to be significant, the data gathered from survey responses could influence future job design and assignment considerations for IRM graduates.

3. Your individual response will be combined with others and will not be attributed to you personally. Again, your participation in the survey is voluntary, but we hope you will take the time to be part of this important research. We would appreciate receiving your response by 15 Jun 91.

4. If you have questions, please contact Dr. Freda Stohrer, [illegible] 785-2820. Thank you.

Edward A. Pardini

EDWARD A. PARDINI, Colonel, USAF
Director of Information Management

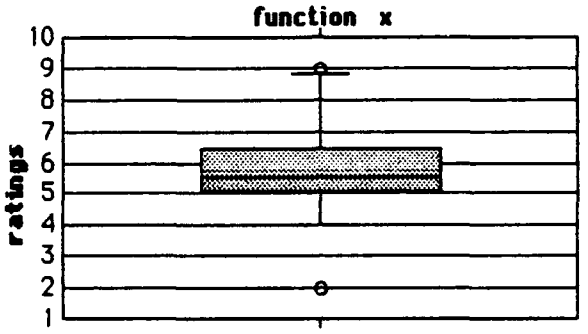
3 Atch
1. Questionnaire
2. Survey Analysis
3. Return Envelope

Analysis of Round-One Responses

Box plots were drawn to correspond to each function statement in Parts II and III of the round-one survey, and show the combined significance ratings for each function. Each plot indicates the **range** (highest to lowest rating), **interquartile range** (IQR - the shaded region, which indicates the middle 50% of the responses, or the majority opinion), and the **median** (the response average, shown by the black horizontal line inside the shaded IQR).

For example, these ratings were given to function "x" by respondents:

6, 4, 7, 5, 6, 9, 4, 2, 6, 6, 5, 6, 4, 7, 9, 5 all of which plot as follows...



The **range** of ratings is from 9 (highest) to 2 (lowest). The **IQR** is from 5 to about 6.5. The **median** (or "average") response for x is ~5.7 for function x. NOTE: the smaller the range of the IQR, the greater the concensus of opinion. Small circles at the top and bottom of some plots show extreme ratings (the ratings 9, 9 and 2 above) which fall outside 80% of all responses.

Instructions for Using Analyses in Round Two

Before you re-rate the significance of each current and future IRM function, please locate your **Round-One Rating** for that function and then, carefully examine the box plot of the **Combined Ratings Analysis** for that function. Feel free to adjust your rating in light of the combined opinions of the rest of the participants, who are all acknowledged experts in this area.

Important: If your round-two rating does not move into the round-one IQR for a function, please provide a specific explanation for the rating. Please try to avoid extreme ratings in round two if possible–our purpose is to develop a concensus of opinion about the roles of IRM grads in base jobs.

Round-One Ratings

current

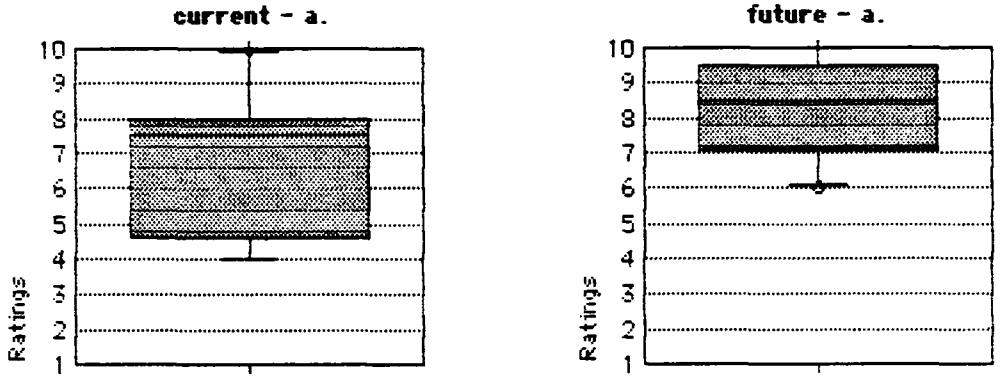
	CODENAME	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
1	FLYJETS(9)	8	6	5	6	6	7	4	4	8	6	9	4	8	5	5	2	3	3	2	6
2	9002HAB(6)	7	5	5	6	6	7	7	6	5	6	9	8	7	6	6	3	5	7	5	7
3	1234567(1)	8	8	4	9	5	9	8	9	9	8	9	8	8	5	5	3	5	4	8	8
4	699353(3)	8	8	6	7	3	4	5	6	8	7	9	4	8	3	4	1	7	2	3	7
5	OREGON(7)	6	5	4	4	1	9	1	1	8	2	6	2	2	5	2	1	1	1	1	1
6	MMTDSC1(8)	4	4	5	9	10	10	10	10	10	8	7	7	6	6	10	2	1	2	7	5
7	IW3865X(9)	9	10	6	9	8	8	7	7	8	8	10	8	6	5	5	5	6	6	4	5
8	IPANGUS(4)	10	6	3	1	5	5	2	1	1	1	2	6	2	6	9	2	8	5	6	4
9	581176A(10)	8	8	10	3	9	8	5	2	5	5	10	5	7	5	5	9	9	9	10	10
10	J2P1M35(7)	8	9	9	9	9	8	6	7	7	7	4	7	6	2	2	6	10	10	6	7
11	ERIN505(10)	4	4	7	9	5	10	9	8	8	8	6	6	6	10	10	2	2	2	7	7
12	AFCC111(8)	5	5	5	8	5	7	5	5	5	7	10	7	3	5	5	1	4	3	2	6
13	1MOUNTA(2)	4	2	3	7	7	8	7	8	8	7	4	8	6	8	8	2	2	2	3	4
14	BEDSTUY(3)	4	5	3	6	4	6	7	7	8	7	9	6	4	6	9	3	4	4	6	8
15	2020RDI(4)	7	7	8	5	4	3	6	3	9	7	8	9	5	5	7	2	2	2	5	4
16	NLW0782(10)	10	10	6	8	7	8	8	8	8	8	8	8	7	3	3	2	5	7	7	8

future

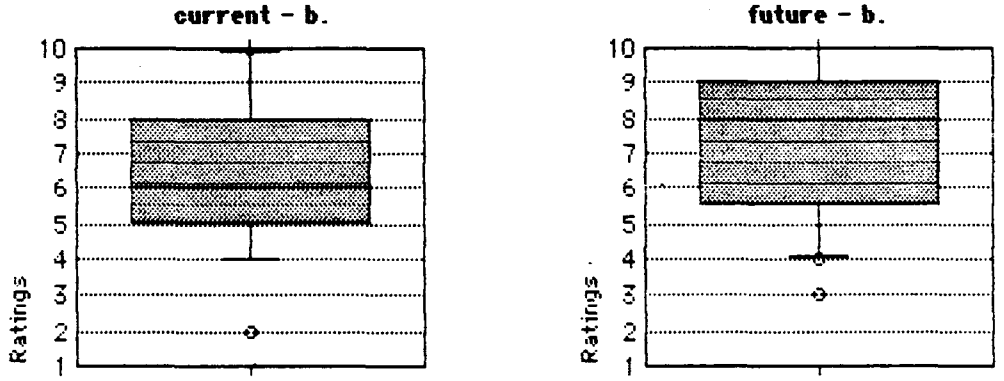
	CODENAME	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
1	FLYJETS(7)	6	6	4	5	4	4	3	2	0	9	8	8	7	8	7	4	5	7	4	5
2	9002HAB(6)	7	5	8	6	6	7	7	6	2	8	9	8	9	6	6	3	7	8	5	7
3	1234567(5)	9	9	7	7	5	8	3	6	2	8	8	9	9	6	6	5	5	5	9	9
4	699353(6)	8	8	6	5	7	8	4	2	6	8	9	6	7	2	5	5	8	4	4	8
5	OREGON(4)	7	3	2	2	9	9	1	1	2	6	8	2	8	7	2	7	7	1	10	8
6	MMTDSC1(8)	9	9	10	8	5	8	2	5	3	7	9	8	8	3	3	8	10	10	9	10
7	IW3865X(8)	9	10	10	8	9	9	5	5	5	10	10	10	10	5	5	5	8	9	5	5
8	IPANGUS(9)	9	8	8	7	6	6	1	7	1	7	4	8	6	2	1	5	10	10	5	9
9	581176A(10)	6	4	5	2	9	8	1	9	5	9	10	6	1	4	4	9	10	10	10	10
10	J2P1M35(8)	8	8	9	7	7	8	6	7	7	7	4	5	4	2	2	4	7	10	4	6
11	ERIN505(10)	10	8	7	9	5	10	9	10	8	10	8	8	10	10	10	5	5	5	9	10
12	AFCC111(10)	10	10	8	5	5	8	5	5	5	5	8	5	8	5	5	8	10	10	8	8
13	1MOUNTA(7)	10	5	8	6	6	6	6	6	6	6	8	6	6	4	3	3	8	8	6	10
14	BEDSTUY(7)	7	8	6	8	8	8	7	6	3	8	9	10	10	5	7	6	6	8	8	9
15	2020RDI(6)	8	8	8	3	3	7	1	2	1	4	8	5	5	4	7	4	6	5	8	4
16	NLW0782(10)	10	10	8	8	7	8	8	8	8	8	8	8	7	1	1	6	10	8	8	8

Combined Ratings Analyses
of Round-One Responses
Current and Future Functions

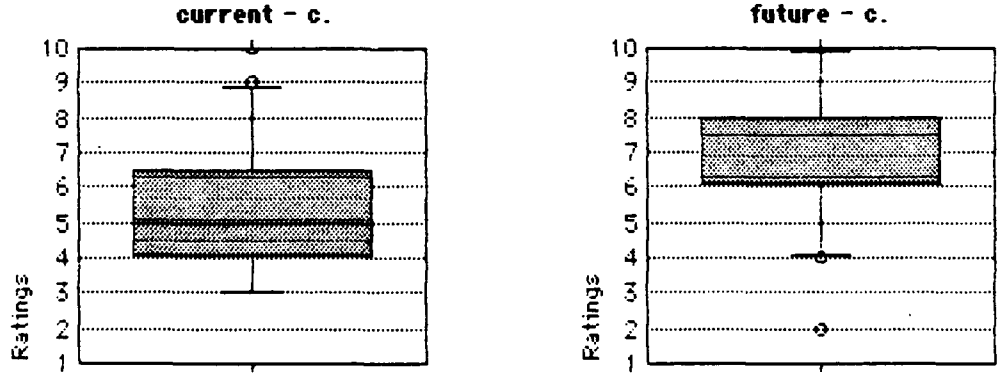
a. Assessing capabilities, establishing priorities, and formulating IM plans and programs.



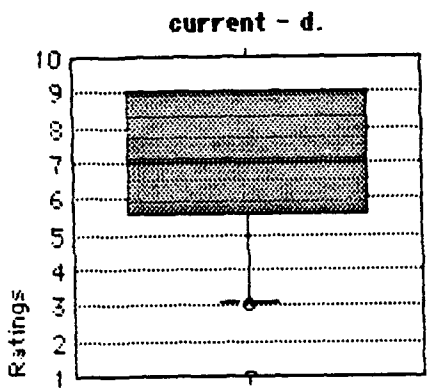
b. Analyzing IM functions for trends in production, use, quality, and propriety of services.

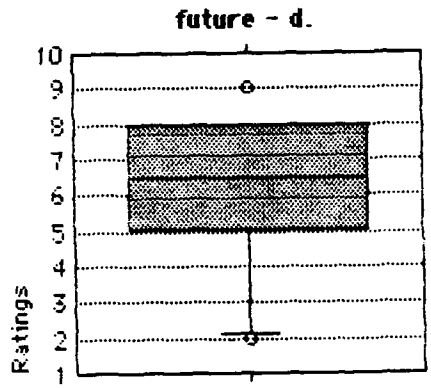


c. Programming automation of high volume, repetitive operations to increase productivity.

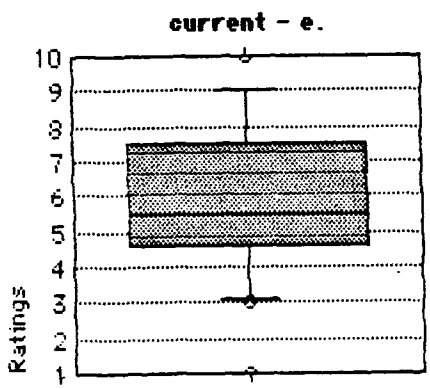


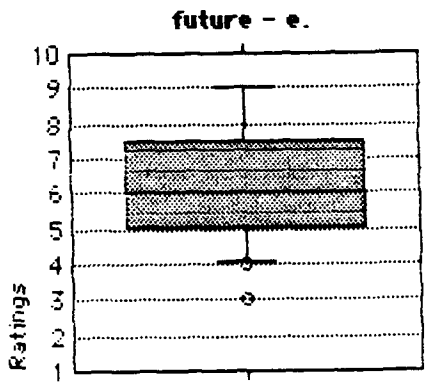
d. Directing IM specialists in managing publications and forms.



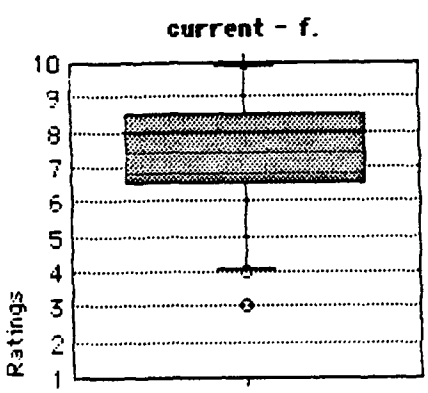


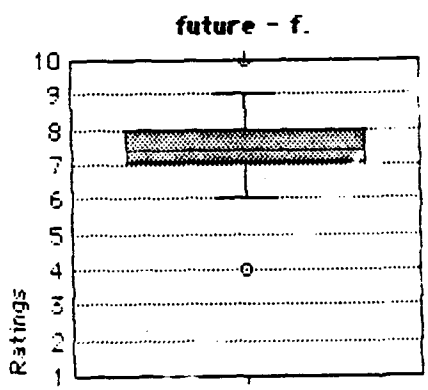
e. Document security and transmissionn.



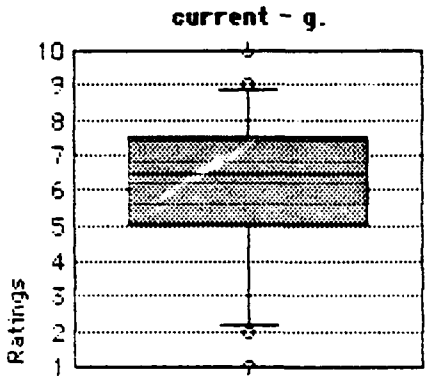


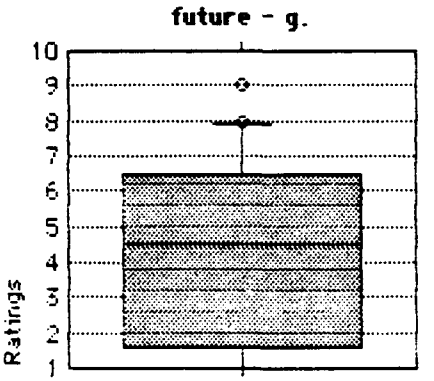
f. Official mail and message processing.



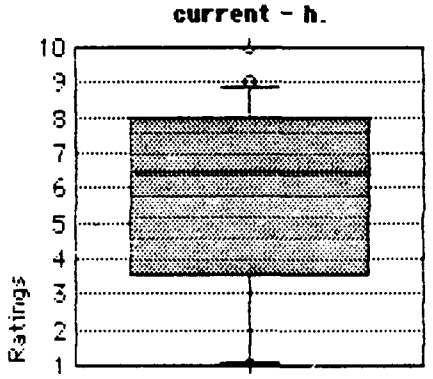


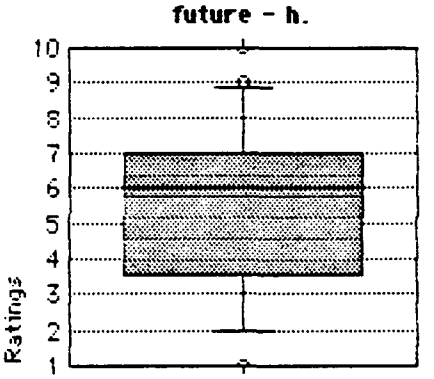
g. Composing and authenticating special orders.



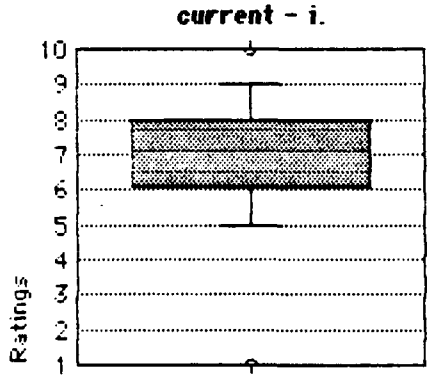


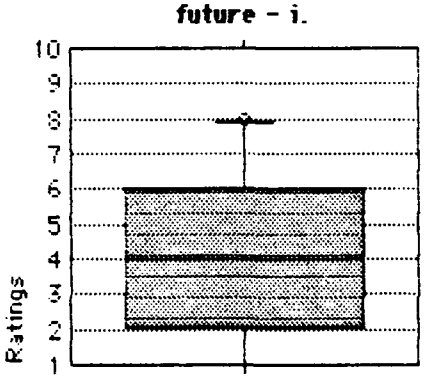
h. Maintenance of the master publications library.



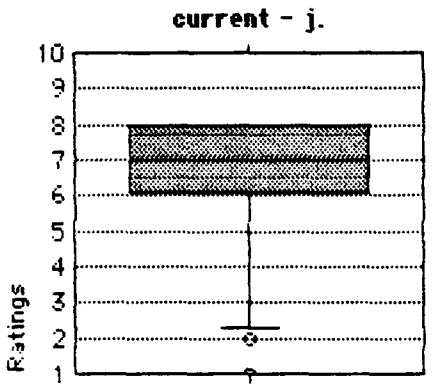


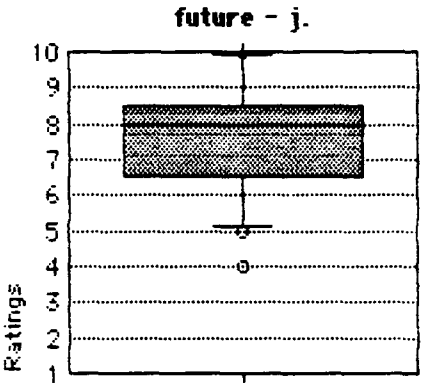
i. Printing, duplicating, and reprographics services.



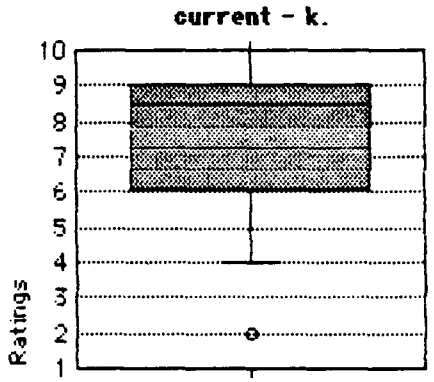


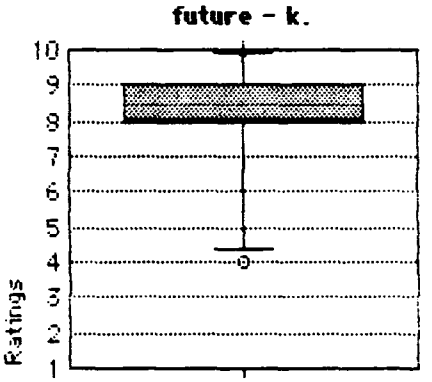
j. Records retrieval, synthesis, miniaturization, storage, and disposal.



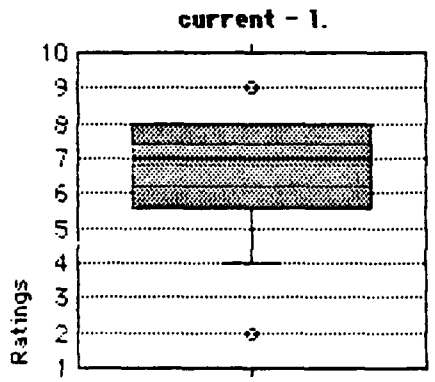


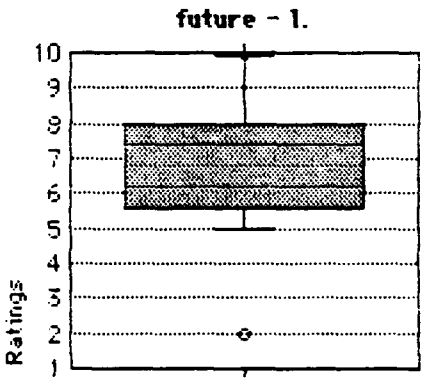
k. Advising the commander on IM and customer service matters.



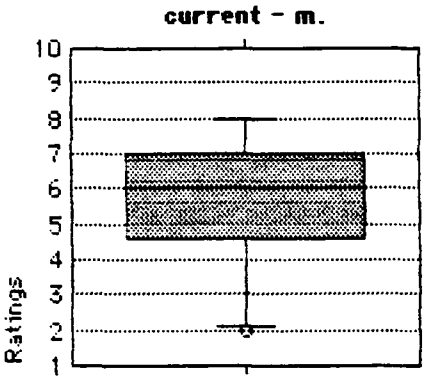


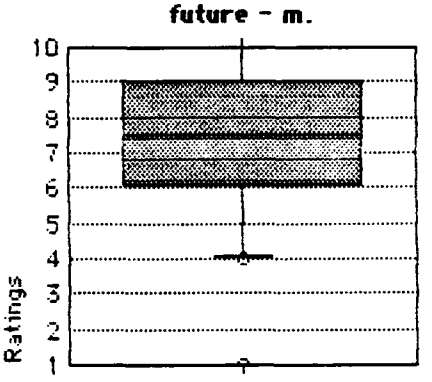
l. Control creation and use of reports, forms, correspondence, directives, and related records.



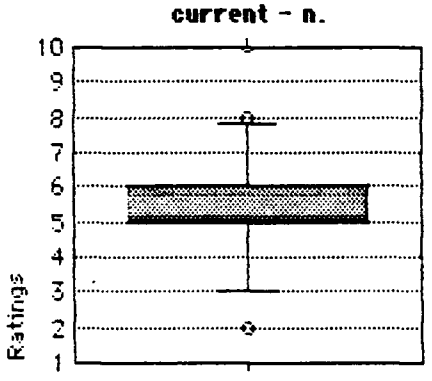


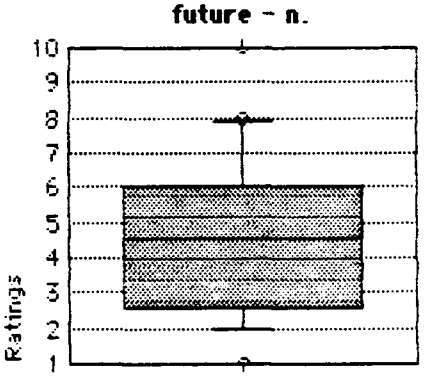
m. Streamlining and simplifying forms, or revising, eliminating, or combining forms.



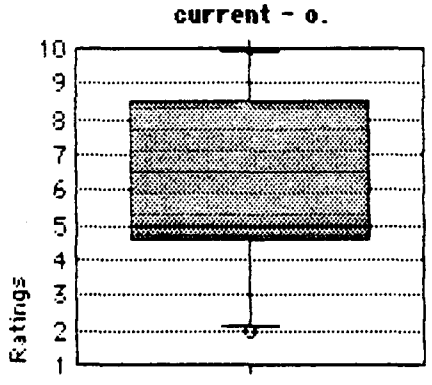


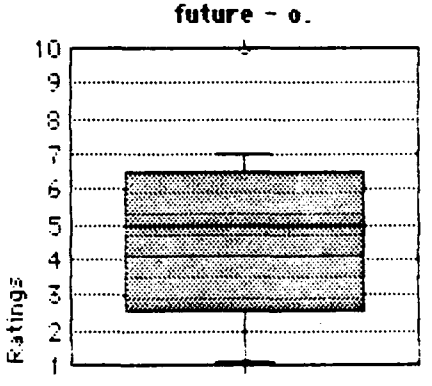
n. Additional duties (permanent functions) not within the realm of information management.



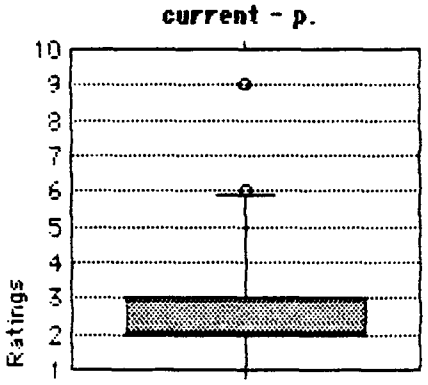


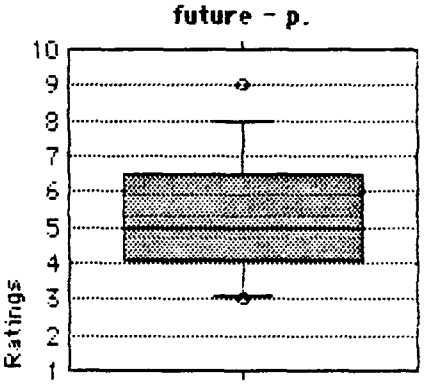
o. Temporary duties (details, taskings) not within the realm of information management.



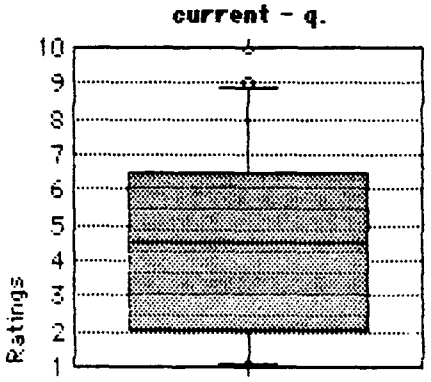


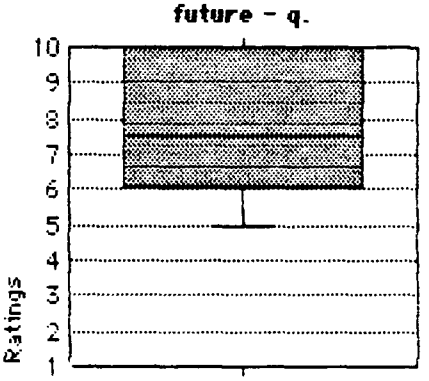
p. Apply descriptive and inferential statistics to analyze IM problems and make decisions.



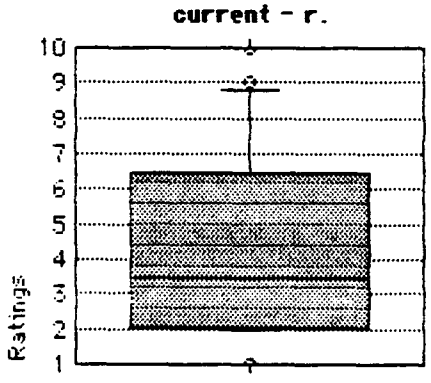


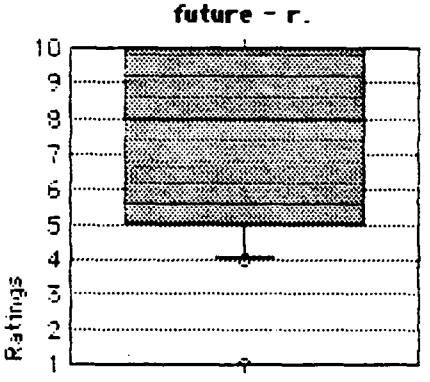
q. Conduct IM systems analysis and make design decisions.



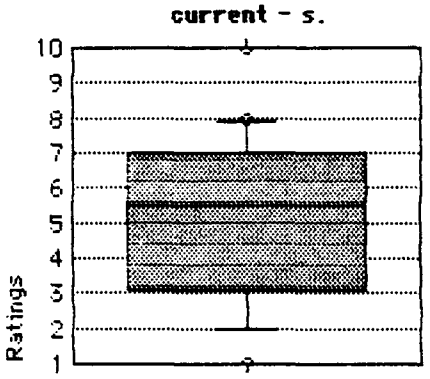


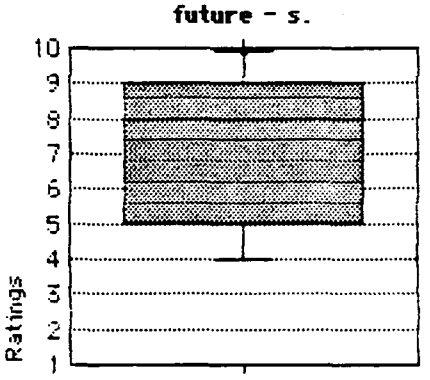
r. Apply computer-based applications to support management decision making.



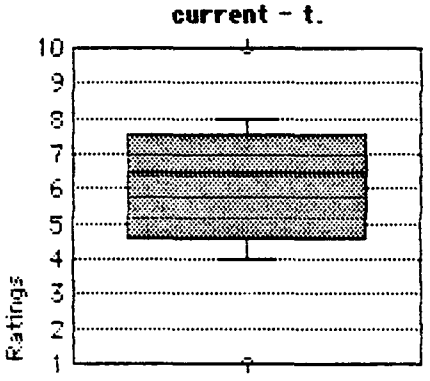


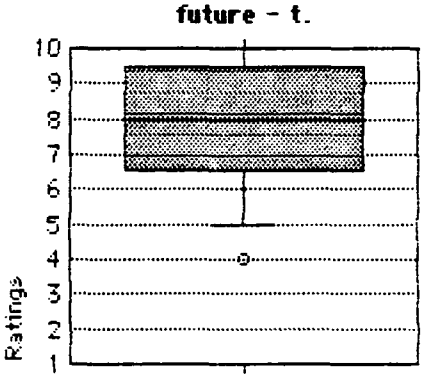
s. Use economic analysis and financial management for acquiring and controlling resources.





t. Conduct or coordinate training for IM specialists.





Second (Final) **Round**

Part I. This section asks for information to match your first-round responses to your second-round responses. Answers to this question enables alignment of participant responses.

Instructions:

Please enter the personal code you used on the first round of this survey. Example: O B 1 K N O B. This is strictly for the purpose of enabling the researcher to align the first and second questionnaires from each survey participant. If you do not remember the code you used on the first-round survey, please leave this blank.

— — — — — — —

* * *

Please have your

Analysis of Combined Round-One Responses

ready to use when

completing this round-two survey.

* * *

Please continue to next page...

Part II. Current roles of IRM grads assigned to base-level jobs. These IM function statements represent the combined descriptors of the Information Management Officer Specialty Summaries and the AFIT School of Systems and Logistics IRM program objectives.

Instructions (please read carefully):

1. Please review the **CURRENT** box plot for each function illustrated in the **Combined Ratings Analysis of Round One Responses** before you re-rate each function below.

2. Please re-rate the significance of each of the following **current** functions in the roles of IRM grads assigned to base-level jobs (ie: how big a part of the job is this function?). Enter only one number, from 1 thru 10, in each blank.

(insignificant) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 **(extremely significant)**

3. **Important:** If your rating of a function in this round continues to fall outside the IQR of the first-round responses, please provide a clear, concise explanation as to why you disagree with the majority opinion in the space provided immediately below the function statement.

a ____ Assessing capabilities, establishing priorities, and formulating IM plans and programs.

_____

b ____ Analyzing IM functions for trends in production, use, quality, and propriety of services.

_____

c ____ Programming automation of high volume, repetitive operations to increase productivity.

_____

d ____ Directing IM specialists in managing publications and forms.

_____

e ____ Document security and transmission.

_____

f ____ Official mail and message processing.

_____

g ____ Composing and authenticating special orders.

_____

h ____ Maintenance of the master publications library.

_____

Part II. **Current roles** - Continued...

(insignificant) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 **(extremely significant)**

i ____ Printing, duplicating, and reprographics services.

j ____ Records retrieval, synthesis, miniaturization, storage, and disposition.

k ____ Advising the commander on IM and customer service matters.

l ____ Control creation and use of reports, forms, correspondence, directives, related records.

m ____ Streamlining and simplifying forms, or revising, eliminating or combining forms.

n ____ Additional duties (permanent functions) not within the realm of information management.

o ____ Temporary duties (details, taskings) not within the realm of information management.

p ____ Apply descriptive and inferential statistics to analyze IM problems and make decisions.

q ____ Conduct IM systems analysis and make design decisions.

r ____ Apply computer-based applications to support management decision making.

s ____ Use economic analysis and financial management for acquiring and controlling resources.

t ____ Conduct or coordinate training for IM specialists.

Part III. Future roles of IRM grads assigned to base-level jobs. This is a restatement of the combined descriptors of the IM Officer Specialty Summaries and the AFIT/LS IRM program objectives in Part II. The future role referred to is projected for five years from now.

Instructions:

1. Please review the **FUTURE** box plot for each function illustrated in the **Combined Ratings Analysis of Round One Responses** before you re-rate each function below.

2. Please re-rate the significance of each of the following **future** functions in the roles of IRM grads assigned to base-level jobs (ie: how big a part of the job is this function?). Enter only one number, from 1 thru 10, in each blank.

(insignificant) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 **(extremely significant)**

3. **Important:** If your rating of a function in this round continues to fall outside the IQR of the first-round responses, please provide a clear, concise explanation as to why you disagree with the majority opinion in the space provided immediately below the function statement.

a ___ Assessing capabilities, establishing priorities, and formulating IM plans and programs.

_____

b ___ Analyzing IM functions for trends in production, use, quality, and propriety of services.

_____

c ___ Programming automation of high volume, repetitive operations to increase productivity.

_____

d ___ Directing IM specialists in managing publications and forms.

_____

e ___ Document security and transmission.

_____

f ___ Official mail and message processing.

_____

g ___ Composing and authenticating special orders.

_____

h ___ Maintenance of the master publications library.

_____

Part III. **Future Roles** - Continued...

(insignificant) 1.....2.....3.....4.....5.....6.....7.....8.....9.....10 **(extremely significant)**

i ___ Printing, duplicating, and reprographics services.

---

j ___ Records retrieval, synthesis, miniaturization, storage, and disposition.

---

k ___ Advising the commander on IM and customer service matters.

---

l ___ Control creation and use of reports, forms, correspondence, directives, related records.

---

m ___ Streamlining and simplifying forms, or revising, eliminating or combining forms.

---

n ___ Additional duties (permanent functions) not within the realm of information management.

---

o ___ Temporary duties (details, taskings) not within the realm of information management.

---

p ___ Apply descriptive and inferential statistics to analyze IM problems and make decisions.

---

q ___ Conduct IM systems analysis and make design decisions.

---

r ___ Apply computer-based applications to support management decision making.

---

s ___ Use economic analysis and financial management for acquiring and controlling resources.

---

t ___ Conduct or coordinate training for IM specialists.

Do you have any other comments which you feel might assist in this research?

_____

_____

_____

_____

<u>Thank you</u> again for your help!

Please return this questionnaire in the envelope provided to:

Major David O. Block, AFIT/LSG, WPAFB OH 45433.

Appendix E: Survey Results Provided to Research Participants

From: Major David O. Block
AFIT/LSG

August 25, 1991

Subject: Results of Two-Round Delphi Survey:
"Roles of AFIT IRM Graduates in Base-Level Roles"

To: Research Participants

Thank you again for your assistance in my AFIT thesis research.

I have pulled the final results of your inputs from my thesis. These are your current and future function ratings and recommendations on how the projected future role might be realized.

Your combined ideas are attached as they were presented to Air Force IM, who sponsored this research. You will probably find that your ideas are at least interesting if not surprising in some cases.

Hopefully, we IRM graduates will increasingly be able to apply our expertise in ways that are most beneficial to the Air Force. Your assistance has provided information that may help a number of us to be more fruitful in our positions.

I'm going to the HQ AFSPACECOM/IMX job in January and will be looking forward to hearing from you.

Sincerely,

David O. Block

1 Attachment
Survey Results

Order of Significance of Functions

All Function Data

Table 1 lists all functions in their descending order of rated significance as an initial, consolidated view of the group's opinions. The "ʃ" column is the letter of each function. "Xm" is the median rating. "IQR" is the range of majority opinion. "IQR %" is the percentage of participants who form the majority. For example, future functions A and K both have an 8.5 median rating and IQR of 1, but A's IQR has an 81-percent majority. Therefore, function A is forecast to be the most significant in the near future. The current and future function statements are listed their in descending order of significance on the next two pages.

Table 1. Rated Significance of Current and Future Role Functions

CURRENT				FUTURE			
ʃ	Xm	IQR	IQR%	ʃ	Xm	IQR	IQR%
F	8.00	1.00	0.88	A	8.50	1.00	0.81
I	8.00	2.00	0.81	K	8.50	1.00	0.75
K	8.00	2.00	0.81	R	8.50	1.50	0.69
L	7.50	2.00	0.94	F	8.00	0.00	0.81
A	7.00	1.50	0.75	J	8.00	1.00	0.88
J	7.00	2.00	0.88	C	8.00	1.00	0.75
D	7.00	2.00	0.69	T	8.00	1.50	0.75
E	6.50	2.00	0.94	L	8.00	2.00	1.00
T	6.50	2.00	0.88	B	8.00	2.00	0.88
G	6.50	2.00	0.81	M	8.00	2.00	0.81
O	6.50	3.00	0.94	Q	8.00	2.50	0.69
B	6.50	3.00	0.81	S	8.00	3.00	0.75
M	6.00	1.50	0.81	E	6.50	1.50	0.75
H	6.00	3.00	0.75	D	6.50	3.00	0.75
N	5.00	1.00	0.88	P	5.00	1.50	0.75
C	5.00	1.00	0.63	N	5.00	2.50	0.75
Q	5.00	3.50	0.69	H	5.00	2.50	0.69
S	4.50	4.00	0.88	O	5.00	3.00	0.75
R	3.50	4.00	0.88	G	3.00	3.00	0.69
P	2.00	1.00	0.94	I	3.00	3.50	0.69

Current Function Statements

Table 2. Current Function Statements in Order of Significance

F	Official mail and message processing
I	Printing, duplicating, and reprographics services
K	Advising the commander on IM and customer service matters
L	Control creation and use of reports, forms, correspondence, directives, and related records
A	Assessing capabilities, establishing priorities, and formulating IM plans and programs
J	Records retrieval, synthesis, miniaturization, storage, and disposition
D	Directing IM specialists in managing publications and forms
E	Document security and transmission
T	Conduct or coordinate training for IM specialists
G	Composing and authenticating special orders
O	Temporary duties (details, taskings) not within the realm of information management
B	Analyzing IM functions for trends in production, use, quality, and propriety of services
M	Streamlining and simplifying forms, or revising, eliminating or combining forms
H	Maintenance of the master publications library
N	Additional duties (permanent functions) not within the realm of information management
C	Programming automation of high volume, repetitive operations to increase productivity
Q	* Conduct IM systems analysis and make design decisions
S	* Use economic analysis and financial management for acquiring and controlling resources
R	* Apply computer-based applications to support management decision making
P	* Apply descriptive and inferential statistics to analyze IM problems and make decisions

Function statements preceded by an * are specific AFIT IRM program curriculum objectives (13). All other function statements are from the IM Officer Specialty Summaries (12) except temporary and additional duties.

Future Function Statements

Table 3. Future Function Statements in Order of Significance

A	-	Assessing capabilities, establishing priorities, and formulating IM plans and programs
K	-	Advising the commander on IM and customer service matters
R	*	Apply computer-based applications to support management decision making
F	-	Official mail and message processing
J	-	Records retrieval, synthesis, miniaturization, storage, and disposition
C	-	Programming automation of high volume, repetitive operations to increase productivity
T	-	Conduct or coordinate training for IM specialists
L	-	Control creation and use of reports, forms, correspondence, directives, and related records
B	-	Analyzing IM functions for trends in production, use, quality, and propriety of services
M	-	Streamlining and simplifying forms, or revising, eliminating or combining forms
Q	*	Conduct IM systems analysis and make design decisions
S	*	Use economic analysis and financial management for acquiring and controlling resources
E	-	Document security and transmission
D	-	Directing IM specialists in managing publications and forms
P	*	Apply descriptive and inferential statistics to analyze IM problems and make decisions
N	-	Additional duties (permanent functions) not within the realm of information management
H	-	Maintenance of the master publications library
O	-	Temporary duties (details, taskings) not within the realm of information management
G	-	Composing and authenticating special orders
I	-	Printing, duplicating, and reprographics services

Function statements preceded by an * are specific AFIT IRM program curriculum objectives (13). All other function statements are from the IM Officer Specialty Summaries (12) except temporary and additional duties.

Meaning of Significance Ratings

The participants' combined ratings of current and future role functions fall into significance groupings defined by median significance rating (Xm) and the level of consensus among the majority about that significance (IQR; a lower number is greater consensus). Refer to Table 1 on page 57. For the purpose of this discussion, these significance groupings are assigned the descriptive terms shown in Table 4.

Table 4. Descriptive Terms for Median Significance Ratings of Functions

Median Rating (Xm)	Range of Majority Opinion (IQR)	Descriptive Term
8.50	1.00 - 1.50	Exceptional Significance
8.00	0.00 - 1.50	Very Highly Significant
	2.00 - 2.50	Highly Significant
7.00 - 7.50	1.50 - 2.00	Fair Significance
6.50	1.50 - 3.00	Average Significance
6.00	1.50 - 3.00	Below Average Significance
5.00	1.00 - 3.50	Low Significance
Below 5.00	1.00 - 4.00	Fairly Insignificant

Significance of Current Functions. Participants almost unanimously view official mail and message processing as the most highly significant function in the current role of IRM graduates assigned to base-level positions. Other highly significant functions include operation of the base printing and reprographics plant and keeping the commander (in current roles, participants interpret this as the immediate supervisor) advised of internal Base IM and customer service matters. According to the experts, moving the mail, making copies, and keeping the boss informed, particularly with regard to these customer services, are the most important role functions IRM graduates perform in their base-level positions.

Fairly significant functions in the role of a base-level IRM graduate include the physical management of printed publications and forms, making IM plans and establishing programs and priorities, and supervising the people who manage physical records storage and disposition. Functions of average significance include document security, IM specialist training, managing special orders, temporary duties outside the realm of information management, and analyzing IM

customer service trends. The experts think additional duties outside the realm of IM and automating repetitive operations are functions of below-average significance.

Of all the above functions, only one of the two below-average- significance functions (automating repetitive operations to increase productivity) begins to make use of base-level IRM graduates' technical management expertise. In spite of the fact they are assigned to positions which are coded in the personnel database as requiring an officer with a graduate IRM degree, the experts think those functions which reflect IRM program objectives have little or no significance in the roles of IRM graduates in base-level positions. It is clear, however, that the research participants, especially those currently serving in base-level positions, do not think the order of significance of these current roles functions is appropriate today, much less five years from now.

Significance of Future Functions. Although the set of function statements are the same for both current and future roles, the participants' comments in the round-two survey indicate their expectation that these function statements will take on new characteristics in the future. The anticipated change in nature of some of the future function statements arises from the research group's belief that these functions will implement technological information management applications being planned today. These changes in function characteristics are discussed below.

The participants think three functions should have exceptional significance in the roles of IRM graduates at base level by 1996: assessing capabilities, establishing priorities, and formulating IM plans and programs; advising the commander (in future roles, this includes senior installation commanders) on information management matters; and applying computer-based applications to support management decision making. According to the experts, the greatest need in the future at base level is an IRM graduate who communicates directly with senior leadership to formulate plans and programs which incorporate the use of computer-oriented information management as a strategic organizational resource.

Although IM plans and programs and advising the commander increase in forecast future significance, the most radical change in significance of any function is that of computer-based applications which support decision making. This last function is projected to rise dramatically from current role insignificance to being exceptionally significant in the near future, and is key to the highest significance grouping of future role functions.

The Delphi panel thinks four functions should be very highly significant in the future roles of IRM graduates at base level and indicated that the character of these functions would need to evolve from a manual to an electronic nature: official mail and message processing; records storage and disposition; programming automation of repetitive operations to increase productivity; and training for IM specialists. The participants projected several functions as highly significant in the future, functions which will evolve electronic computer systems

characteristics: controlling and using publications and forms; analyzing IM functions for trends in quality and propriety of services; conducting IM systems analysis and making design decisions; and using economic analysis and financial management for acquiring and controlling resources.

Some of the highly to exceptionally significant functions owe their standing in the order to the research panel's belief that they simply need to be more significant in the future. Most of these ratings are a reflection of the panel's expectation that new computer-based information management applications and the increasing availability of other more sophisticated IM resources will change the nature of these functions and hence, their level of role significance. On the other hand, new technology is expected to decrease the significance of some functions in the future.

Document transmission and security, and directing IM specialists in managing publications and forms are expected to decrease to only average significance in the future roles of IRM graduates at base level because the participants expect that information networks will enable users to perform these functions themselves with on-line resources. The reason also applies to the decrease to relative insignificance of the functions of maintaining the master publications library and the creation of special orders.

The use of statistics for problem solving and decision making will require only a moderate increase in significance in the future for the base-level IRM graduate, a forecast probably influenced by the participants' awareness that current total quality management initiatives rely on the use of statistical analysis. Additional and temporary duties drew mixed ratings of future significance from the group and lower levels of consensus, though overall these functions, according to the panel, need to be less significant in the future. Printing, duplicating, and reprographics are expected to be fairly insignificant in the future since this function may no longer fall within the role of base-level IRM graduates in the near future.

Resolving the Difference Between Current and Projected Roles

Part IV of the round-one survey asked participants to make "specific suggestions on what needs to happen to change from the current roles to the required future roles" they projected for IRM graduates assigned to base-level roles. (See page xx of Appendix C). They were asked to number their recommendations in prioritized order. Their combined views formed six areas of recommendation which are presented below in their order of frequency of agreement among the participants—the area of greatest consensus is presented first. Within each recommendation area are the quoted and summarized suggestions of the group.

Senior Air Force Information Management Leadership

Of the 44 recommendations participants gave as necessary in order to transition to the required future role for IRM graduates at base level, 13 (30 percent) are concerned with senior IM leadership. Five of the thirteen recommendations in this area were listed as a first priority.

In the combined opinion of the research participants, the single most important factor in transitioning from the current to the required future role for IRM graduates assigned to base-level positions is "a change in the attitudes of IM about itself and its mission." This transition must begin by replacing "the old-fashioned attitudes of senior IM leadership" with a "new perspective of IM and view of the future." In conjunction with this change in outlook, the career field as a whole "needs direction from the top about where we should be headed to establish our roles." IM leadership should not "(wait) for other career fields' senior leaders to define IM policies."

Specific suggestions in this area for the Air Force Directorate of IM include "pro-active integration of IM plans with the rest of the Air Force," top-down "communication of the big-picture plans," involvement of "senior IM leadership in new technology," and aggressive promotion, funding, and implementation of an "IM messaging network, electronic records management, and the involvement of base IRMs in the design of IM systems and software."

The AFIT Information Resource Management Program

The AFIT IRM program drew nine (20 percent) of the total recommendations for needed change. Four of the nine were listed as a first priority. The first general consensus in this area is that there should be more people in base-level positions with an IRM education, though a minority believe "70XXs should have base IM experience before" IRM studies. In either case, the overwhelming majority opinion of the group is the "IRM program must be tailored to 'real' Air Force needs."

In making specific suggestions for changes in the IRM program, the participants—all IRM graduates—focused on three areas of the program they believe need to be enhanced to help effect transition to the forecast role. They suggested the program "develop better writing skills," more in line with "Air Force, not AFIT writing," and that the program provide more education in "the base-level budgeting process. . .and economic analysis." By far the most frequent recommendations are to enhance the development of "systems analysis skills for base-level applications" and greater emphasis on the "technology to improve information flow to increase productivity." In short, the participants believe adapting the IRM curriculum so graduates can "get smarter about computers" and their practical applications at base level is necessary to help change from the current to the future base IRM role.

The IRM Graduate at Base Level

Seven (16 percent) of the experts' recommendations for effecting role change are actions the IRM graduate at base level can take directly. The graduate can begin by developing "a knowledge of the base's computer hardware and systems," and establishing "an office automation group." The graduate should "promote the use of electronic data communications," and become "more pro-active in information analysis services." As a result, he or she can "look for jobs to automate" now and in the future and will establish a new role "involved with developing information systems on the base." Eventually, the graduate will be able to initiate "the testing and development of base-level information technology, on-line services, etc."

Other specific suggestions in this area refer to the education of senior base commanders as to the graduate's capabilities. These are presented in the next section as a separate area of recommendation.

Education of Commanders

Six (14 percent) of the recommendations fell in this area which applies to all levels of Information Management. The Air Staff IM "must define, publish, and educate the Air Force in IM roles which point toward the future" and the ideal "purpose of IM." The MAJCOM IMs should "inform commanders of the qualifications of IRM graduates" as well as "emphasize to commanders what IM really does and what roles it should be doing in the future." The IRM graduates at base level should also "educate commanders about information management ideas today," apprise "commanders of their capabilities," and do so by example and demonstration "rather than just talking about them."

Merger of IM with SC

Five (11 percent) of the suggestions of needed changes fell in the area of merging IM and communications/computer systems (SC) organizations. The central theme in this area is that "the IM career field should merge with the Communications/Computer Systems career field. . .to become two sides of the same coin," and the recommendations go beyond the question of base-level IRM graduate roles. The participants provided specific, base-level comments like, "at base level, develop a working relationship with SC," or "the base IM should merge with the SC unit," or base-level IRMs should "get out from under the personnel world. . .and under the communications squadron commander." However, most of their ideas, which would also affect base-level IRM roles, were aimed at changing the highest organizational levels.

The group generally agreed it will be necessary to "change the IM organizational structure. . .to align IMs with computer managers for true information management." The research participants see the two-sided utility of an IM/SC consolidation as the effective and necessary merger of "developers (IM) and builders (SC)" to best serve Air Force users.

Changes in the 70XX Air Force Specialty Code

Four (9 percent) of the suggested changes for realizing the projected future roles of IRM graduates assigned to base-level roles is a small set of ideas concerned with the IM officer AFSC. The comment that "more rank in the career field" is needed [the highest IM officer grade currently authorized is O-6] implies that necessary future changes might be less difficult to effect if the career field had a higher rank at the top. Other recommendations in this area complemented the idea of IM/SC merger: once IRM-oriented 70XXs had been absorbed by SC, the "staff support 70XXs (should become) 73XXs" [part of the personnel officer career field]. Finally, some participants think every effort should be made to "train more (officer and enlisted) IM personnel to be computer literate."

Meaning of Change Recommendations

The research participants recommended changes they believe are necessary to resolve the difference between the current role they have described and the role they forecast for 1996. Their ideas have been presented in order of frequency of agreement among the group; however, suggestions in the last areas should not be considered insignificant by virtue of their position in the consensus order.

Almost one-third of all the participants' recommendations express a view that Air Force Information Management is not what it could or should be and that changing it is primarily the responsibility of senior IM leadership. The research group, concerned with the base-level roles, and hence the lowest organizational level of assignment, of IRM graduates, views the most important changes affecting these graduates as ones which will affect the Air Force IM community as a whole, from the top down. New attitudes and perspectives, direction, involvement, communication, and leadership are called for by the experts to change the direction of Air Force IM, and consequently, the role of IRM graduates at base level to one that is needed not only now but moreso five years from now.

Whether before or after the IRM program, the experts agree that IRM graduates should have experience at base level as the Chief of Base Information Management. This second-most-frequent recommendation came from a group of 16, only six of whom have experience as a Base IM. The experts obviously think this particular experience has practical value. The group as a whole extols the value of the IRM education, though virtually all of them believe the program can be improved to help realize the role they have forecast for base-level graduates. In short, the experts assert that the IRM program and its curriculum should be refined to emphasize those things that will be of the greatest practical value to the graduates in the field.

The experts acknowledge that the base-level IRM graduate has a responsibility to contribute efforts to change from the current to the forecast role. The graduate should not sit back

and wait for changes to flow down from above but is expected to aggressively promote those functions that belong to the necessary future role. The IRM graduate at base level should join other IM leadership in educating commanders about what IM is, what it should be, and its value as a strategic resource on the installation.

The participants have a collection of ideas about reorganizing the structure of information management which range from aligning IM with the communications/computer systems career (SC) field to splitting the IM career field into those officers who perform information resource management and those who perform executive support and administrative functions. The general trend of the experts' view in this change area is that somehow, IRM graduates should come out from under the organizational supervision of the personnel career field, rise from an organizational standing some three or four levels of supervision beneath the senior installation commander, be aligned more closely as IM developers with the SC builders, and be given the opportunity and mandate to apply their IRM expertise in a manner they believe will be required by 1996.

Bibliography

1. Ahituv, Niv and others. "Factors Affecting the Policy for Distributing Computing Resources," MIS Quarterly, 13: 389-401 (December 1989).

2. Amoroso, Donald L. and others. "Examining the Duality Role of I.S. Executives: A Study of I.S. Issues," Information & Management (Netherlands), 17: 1-12 (August 1989).

3. Brancheau, James C. and James C. Wetherbe. "Key Issues in Information Systems Management," MIS Quarterly, 11: 23-45 (March 1987).

4. Brown, Eric H. and others. "The Chief Information Officer in Smaller Organizations," Information Management Review, 4: 25-35 (Fall1988).

5. Brumm, Eugenia K. "Chief Information Officers in Service and Industrial Organizations," Information Management Review, 5: 31-45 (Winter 1990).

6. Carlyle, Ralph Emmett. "Careers in Crisis," Datamation, 35: 12-16 (August 15, 1989).

7. -----. "CIO: Misfit or Misnomer?" Datamation, 34: 50-56 (August 1, 1988).

8. Caudle, Sharon L. "Off the IRM Mark at the Federal Level," Journal of Systems Management, 39: 6-10 (August 6, 1988).

9. ---- and others. "Key Information Systems Management Issues for the Public Sector," MIS Quarterly, 15: vii-ix (June 1991).

10. "CIO is Starting to Stand for 'Career is Over,'" Business Week, 78-80 (February 26, 1990).

11. Department of the Air Force. Air Force Institute of Technology. School of Systems and Logistics. Air Force Institute of Technology Pamphlet 53-26, Graduate Information Resource Management Program. Wright-Patterson AFB OH, 20 May 1988.

12. Department of the Air Force. Personnnel: Officer Air Force Specialties. AFR 36-1(C2). Washington DC: HQ USAF, 15 September 1989.

13. ----. Graduate Programs Handbook. Air Force Institute of Technology, School of Systems and Logistics, Wright-Patterson AFB OH, September and December 1991.

14. Dickson, Gary W. and others. "Key Information Systems Issues for the 1980s," MIS Quarterly, 8:135-148 (September 1984).

15. Drucker, Peter F. "The Coming of the New Organization." Harvard Business Review, 463-472 (January/February 1988).

16. Emery, James C. "What Does the CIO Need to Know About Information Technology?" Editor's Comments, MIS Quarterly, 13: xv-xvi (December 1989).

17. ----. "What Role for the CIO?" Editor's Comments, MIS Quarterly, 15: vii-ix (June 1991).

18. Erffmeyer, Robert C. and others. "The Delphi Technique: An Empirical Evaluation of the Optimal Number of Rounds," Group and Organization Studies, 11: 120-128 (March-June 1986).

19. Fogerty, Capt Dan, Resource Management Officer (Palace Info), Headquarters Air Force Military Personnel Center. Telephone Interview. Randolph AFB TX, 23 February 1990.

20. Gordon, T. J. "New Approaches to Delphi," Technological Forecasting for Industry and Government, edited by James R. Bright. New Jersey: Prentice-Hall, Inc., 1968.

21. Harmon, Bruce F. A Study of the Air Force's Current Method of Training Individuals to Use Contractor Developed Software in Information Management and the Perceived Effectiveness of the Training. MS Thesis, AFIT/GIR/LSQ/90D-5. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, December 1990 (AD-A229595).

22. Hartog, Curt and Herbert Martin. "1985 Opinion Survey of MIS Managers: Key Issues," MIS Quarterly, 10: 351-361 (December 1986).

23. Hayley, Kathryn J. "CIO Challenges in the Changing MIS Environment," Journal of Information Systems Management, 6: 8-13 (Summer 1989).

24. Helmer, Olaf. "Analysis of the Future," Technological Forecasting for Industry and Government, edited by James R. Bright. New Jersey: Prentice-Hall, Inc., 1968.

25. Igbaria, Magid. "Career Orientations of MIS Employees: An Empirical Analysis," MIS Quarterly, 15: vii-ix (June 1991).

26. Ives, Blake and Margrethe H. Olson. "Manager or Technician? The Nature of the Information Systems Manager's Job," MIS Quarterly, 5: 49-63 (December 1981).

27. Jarvenpaa, Sirkka L. and Ives, Blake. "Executive Involvement and Participation in the Management of Information Technology," MIS Quarterly, 15: vii-ix (June 1991).

28. Jensen, Maj Melissa W., SAF/AAIAX. Proposed Thesis Topic. SAF Directorate of Information Management, Washington DC, May 1990.

29. Keen, Peter G. W. "IMR Interview," by Donald A. Marchand, Editor, Information Management Review, 4: 65-75 (Winter 1989).

30. Lanford, H. W. Technological Forecasting Methodologies. American Management Association, Inc., 1972 (Originally published under the title, A Synthesis of Technological Forecasting Methodologies, AMA, Inc., 1972).

31. Mandanis, George P. "The Future of the Delphi Technique," Technological Forecasting, edited by R. V. Arnfield. Edinburgh University Press, 1969.

32. Mangurian, Glenn E. "Tomorrow's CIO Today," Information Strategy: The Executive's Journal, 4: 12-15 (Summer 1988).

33. Martino, Joseph P. Technological Forecasting for Decisionmaking. New York: Elsevier, 1975.

34. McClave, James T. and George P. Benson. Statistics for Business and Economics. San Fransisco: Dellen Publishing Company, 1988.

35. McGhee, Richard T. Air Force Information Management: A 1990 Snapshot and 1995 Future Look at Air Force IM Needs and Preferred Education/ Training Approaches. MS Thesis, AFIT/GIR/LSM/90D-6. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, December 1990 (AD-A229695).

36. Nations, William O. Graduation Address to AFIT Information Resource Management Graduates. Holiday Inn, 2800 Presidential Drive, Fairborn OH, 13 December 1989.

37. Parente, Frederick J., and others. "An Examination of Factors Contributing to Delphi Accuracy," Journal of Forecasting, 3: 173-182 (1984).

38. Raghunathan, Bhanu and T. S. Raghunathan. "Relationship of the Rank of Information Systems Executive to the Organizational Role and Planning Dimensions of Information Systems," Journal of Management Information Systems, 6: 111-126 (Summer 1989).

39. StatView SE+Graphics: The Solution for Data Analysis and Presentation Graphics. ISBN: 0-944800-00-9. Abacus Concepts, Inc., Berkeley CA, 1986.

40. Synnott, William R. "The Emerging Chief Information Officer," Information Management Review, 3: 21-35 (Summer 1987).

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	December 1991	Master's Thesis

4. TITLE AND SUBTITLE
A DELPHI FORECAST OF 1996 ROLES: AIR FORCE INSTITUTE OF TECHNOLOGY INFORMATION RESOURCE MANAGEMENT GRADUATES ASSIGNED TO BASE LEVEL

5. FUNDING NUMBERS

6. AUTHOR(S)
David O. Block, Major, USAF

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Air Force Institute of Technology, WPAFB OH 45433-6583

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/GIR/LSR/91D-1

9. SPONSORING MONITORING AGENCY NAME(S) AND ADDRESS(ES)
SAF/AAI
The Pentagon
Washington DC 20330

10. SPONSORING MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

Graduates of the Air Force Institute of Technology's Information Resource Management master's degree program who are subsequently assigned to base-level positions believe their IRM expertise is wasted in base administration roles that preclude the use of their up-to-date technical educations in managing automated information resources.

This research forecasts the role AFIT IRM graduates assigned to base-level positions will need to fill by the year 1996. This research further determined what changes are necessary to resolve the perceived differences between current and forecast roles for these graduates.

The Delphi survey method of forecasting was selected as an effective method of discovering what role the graduates will need to fill five years from now. The primary advantage of this method was that it provided a select group of knowledgeable individuals an opportunity to develop a consensus of opinion in regard to the general role and specific functions of an IRM graduate at base level. Also, this method ordered the experts' ideas about what it will take to transition to the new role.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Information resource management, Roles (AFIT graduates), Delphi (forecasting), Graduates (AFIT IRM)	129
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

AFIT Control Number AFIT/GIR/LSR/91D-1

AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. Please return completed questionnaires to: AFIT/LSC, Wright-Patterson AFB OH 45433-6583.

1. Did this research contribute to a current research project?

   a. Yes b. No

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it?

   a. Yes b. No

3. The benefits of AFIT research can often be expressed by the equivalent value that your agency received by virtue of AFIT performing the research. Please estimate what this research would have cost in terms of manpower and/or dollars if it had been accomplished under contract or if it had been done in-house.

   Man Years _____ $_____

4. Often it is not possible to attach equivalent dollar values to research, although the results of the research may, in fact, be important. Whether or not you were able to establish an equivalent value for this research (3 above), what is your estimate of its significance?

   a. Highly Significant b. Significant c. Slightly Significant d. Of No Significance

5. Comments

_____ _____

Name and Grade Organization

_____ _____

Position or Title Address