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MANAGING INFORMATION SYSTEMS
CAREER PATHS

by

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Kirsten R. Wever

WP#1481-83

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Introduction

Over the next ten years the success of many businesses will turn on the fundamental information systems (I/S) and computer skills of all of their personnel. At the same time, more and more firms will experience difficulties in getting the right kinds of I/S professionals to design, install and service the systems they will increasingly come to rely on. The problem will be due largely to the fact that the dynamics of I/S careers have been ad hoc, in contrast to relatively structured career paths in most functional areas of U.S. business organizations. The adequate integration of the right kinds of I/S personnel (and thus I/S departments/divisions) can only be achieved on the basis of careful and purposive recruitment, motivation, promotion and continuing training/education of I/S personnel.

At the same time, it will be necessary to take into account the rapidly changing nature of the I/S field itself, and the role of I/S departments/divisions within the firm. The era of the supply-driven I/S environment is rapidly drawing to a close. Users are no longer willing to demand simply what I/S decides, or is able, to supply. The technical sophistication of user departments is growing rapidly; at the same time user demands pose more challenges to I/S departments.

This paper was written as part of the Human Resource Policy Project, Center for Information Systems Research (CISR), Alfred P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA 02139. The authors would like to thank the individual participants and corporate sponsors who took part in this study. Their names are not mentioned herein due to our confidentiality agreements with them. Thomas A. Barocci is Senior Lecturer at the Sloan School of Management; Kirsten R. Wever is a Ph.D. candidate at MIT; Debra A. Tessier was a masters student at the Sloan School. Special thanks are due Ms. Christine V. Bullen, Assistant Director of CISR and Marc Gordon, our user oriented research assistant.
than they have in the past. In order to meet these challenges I/S personnel at all levels will be called upon to hone their user-liaison, and business consulting skills, and possibly even more important, their functional skills.

Growing user sophistication is not the only reason why management must develop a better understanding of I/S career paths and I/S professionals' career-related motivations and aspirations. Equally crucial is the fact that the importance of the I/S function within the firm has grown in quantum terms over the last 5-10 years; special I/S technologies now provide critical bases of both domestic and international competitiveness in a wide range of firms and industries, particularly where the relevant information derives from transaction processing.

Finally, I/S professionals themselves are clamoring for more employer involvement in the development of their careers.* To ignore their preferences is to run the risk of alienating, losing, or ensuring low productivity among a group of professionals that is and will continue to be in high demand and short supply.

The bottom line is, of course, market competitiveness. The human resource aspects of I/S are fundamental to the productive integration of I/S departments, divisions and personnel into the companies that will rely on them more and more to maintain economic competitiveness throughout the 1980s and 90s. The I/S field is technology-driven; the I/S environment has become demand-driven. If I/S departments supply personnel, products and services that

inadequately meet user needs, user departments can now turn to outside vendors, or "do it themselves" by hiring their own I/S personnel or consultants.

The purpose of this paper is to consider three aspects of I/S careers in the context of the technological dynamics of the field: 1) the typical career patterns of I/S professionals; 2) the career aspirations of these professionals; and 3) the career models and paths that will be prescribed by changes in the nature of I/S as a field, and in the role of I/S within the firm. This analysis will allow us to explore some more specific career structures necessary to anticipate the future technological dynamics of the I/S field.

This paper is based on a series of 800 interviews and questionnaires gathered at 18 firms in a variety of industrial sectors. The database discussed here includes responses from personnel in the following job categories: programmer, systems analyst, technical staff, project leader, project manager, systems development manager, technical staff manager and I/S director. The respondents each completed a lengthy questionnaire covering issues concerning their job descriptions, educational and professional development, career paths (past and expected), recruitment and hiring experiences, and evaluation of colleagues, supervisors, and managers.*

**Observed I/S Career Paths:**

We begin with a description of the past career paths of the respondents in our eight job categories, separating these into

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*Human Resource Policy Project, Center for Information Systems Research, Sloan School, M.I.T.
managerial and non-managerial respondents.** We will then examine
the career aspirations of these two groups of respondents and
juxtapose these aspirations against projected future I/S skills-mix
requirements.

Among all four non-managerial job categories (programmer,
systems analyst, technical staff, project leader), programming
provides by far the most common background experience. Of the
programmers, almost two-thirds had also been programmers in their
previous two jobs within the same firm. About half had been
programmers in their previous two jobs at other firms. Those who had
been with their present companies long enough to have held four or
five prior positions there had all had experience in systems analysis
and/or as technical staff. (Current career paths in I/S are
aggregated and illustrated in Figure 1.)

Somewhere between 2/3 and 3/4 of the systems analysts,
technical staff and project leaders had also been in the same job
category in their previous positions. Prior to that, the systems
analysts' experience was heavily in programming. Many of the
technical staff respondents had also been systems analysts and/or
programmers; the project leaders were drawn from programming, systems
analyst and technical staff positions.

The role of programming is also strong in the past career paths
of the managerial respondents. Among the project managers, systems
development managers and technical staff managers, a good proportion
of the respondents had previous experience in both programming and
project leadership. A number of the project managers also had

**A requirement for participation in the sample group included
managerial or supervisory experience. The "non-managerial" category
represents those respondents whose current job responsibilities are
non-managerial, backgrounds as systems analysts and technical staff.
Not surprisingly, systems development managers had a good deal of experience as systems analysts, and technical staff managers' backgrounds included many technical staff positions.

The backgrounds of the I/S directors are by far the most eclectic of all our job categories. 80% had been I/S directors in their previous jobs within the firm. Of those that had been with their present firms long enough to hold several positions there, the largest percentage came from systems development management positions, but significant numbers had also been project managers, technical staff managers, operations managers, planning managers and telecommunications managers. Those who had held four or five positions within their current firms had been distributed across positions in project leadership, systems analysis, user liaison, telecommunications, technical staff and project management. (Almost one-fifth had been programmers with previous companies.)

This analysis reveals two particularly noteworthy results. First, programming furnishes the most common prior experience across all job categories. Second, while the directors' backgrounds are distributed among a wide range of I/S positions, most of them began as programmers at previous firms. It is also apparent that the overwhelming majority of our respondents' career paths are concentrated in one particular area of the I/S field. For example, technical staff managers have technical staff experience, systems development managers used to be systems analysts, and so on. This uniformity applies to almost all of our job categories. (See figures 2 & 3.)

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I/S Career Aspirations:

The career aspirations of our respondents do not entirely mesh with the trends implied from past promotional paths. The non-managerial respondents aspire (from the programmer and technical staff levels) first to positions in project leadership and systems analysis; from there the majority would like to go into systems development management (most of the remaining correspondents seek technical staff management and project management jobs at this stage); finally, they aspire overwhelmingly to I/S directorships.

The managerial respondents were interested in a slightly wider range of future jobs, including management positions in systems development, telecommunications, technical staff and other I/S positions not included on the list in our questionnaire. The systems development managers and particularly the I/S directors aspired to "other positions." (It is noteworthy that five percent of the I/S directors hoped for jobs in operations management.)

At this point it will be useful to consider what I/S career paths will look like in the future, based on technological trends in the field. Projected I/S career paths are juxtaposed on past career paths in figure 4. There is an obvious gap between the respondents' career aspirations and the projected career paths shown in figure 4. (Compare figure 4 with figures 5 and 6.) On the one hand, I/S directorships are the most sought-after positions among our respondents; on the other hand, positions in special technologies and management support systems (MSS) are projected to be of increasing importance in the future. It is clearly impossible for all those respondents who ultimately aspire to I/S directorships actually to attain that position. There are only so many I/S directorships to go
FIGURE 1

CURRENT CAREER PATHS

- Modal Path
- Increasing Path
- Outlier Path

SPECIAL TECHNOLOGIES STAFF MANAGER

SPECIAL TECHNOLOGIES STAFF

USERS

I/S DIRECTOR

SYSTEMS DEVELOPMENT MANAGER

SYSTEMS DEVELOPMENT PROJECT MANAGER

SYSTEMS DEVELOPMENT PROJECT LEADER

SYSTEMS ANALYST

PROGRAMMER

TOP MANAGEMENT
LINE V.P.
STAFF V.P.
STAFF MANAGER
NON-MANAGERIAL RESPONDENTS' PAST CAREER PATHS

Current Job:  
- PROGRAMMER  
- SYSTEMS ANALYSTS  
- TECHNICAL STAFF  
- PROJECT LEADER

Prior job with same firm:
- PROGRAMMER  
- SYSTEMS ANALYST  
- TECHNICAL STAFF  
- PROJECT LEADER

2nd & 3rd prior jobs with same firm:
- PROGRAMMER  
- SYSTEMS ANALYST  
- TECHNICAL STAFF  
- PROJECT LEADER

4th & 5th prior jobs with same firm:
- PROGRAMMER  
- TECHNICAL STAFF  
- SYSTEMS ANALYST

Last two jobs with prior firm:
- PROGRAMMER  
- SYSTEMS ANALYST  
- TECHNICAL STAFF

Key:
- POSITION = over 50% of respondents
- POSITION = 30-50% of respondents
- (POSITION) = 15-29% of respondents
- (position) = 10-14% of respondents
Figure 3
MANAGERIAL RESPONDENTS' PAST CAREER PATHS

Current Job: /PROJ. MGR./ /SYS. DEV. MGR./ /TECH. ST. MGR./ /I/S DIRECTOR/

Prior Job with same firm:
PROJ. MGR. SYS. DEV. MGR. TECH. ST. MGR. I/S DIRECTOR

2nd & 3rd prior jobs with same firm:
(SYSTEMS ANALYST) (PROJECT MANAGER)
(SYSTEMS DEVELOPMENT MANAGER) (PROJECT LEADER)
(programmer)

4th & 5th prior jobs with same firm:
(PROGRAMMER) (SYSTEMS ANALYST)
(PROJECT LEADER) (director)

Last 2 jobs with prior firm:
(PROGRAMMER) (SYSTEMS DEVELOPMENT MANAGER)
(SYSTEMS ANALYST) (project leader)

Key:
POSITION = over 50% of respondents
POSITION = 30-50% of respondents
(POSITION) = 15-29% of respondents
(position) = 10-14% of respondents
around. At the same time, it is evident that in the absence of career structuring programs there will be a severe shortage of I/S professionals aspiring to move into special technologies and MSS.

Finally, the projected I/S career paths illustrated in figure 4 indicate the increasing involvement of users at all levels. Consequently, the user liaison function will also grow in importance. But our respondents were largely uninterested in this position. It is true that the average respondent considered his/her role in increasing user satisfaction to be important. In the aggregate, 92% either agreed or strongly agreed to this proposition (of which two-thirds agreed strongly). But at the same time, a surprisingly large number of the respondents saw the user liaison position as being either a "dead end" (on average, 7.5%) or outside the career ladders leading to higher technical and/or managerial positions (in the aggregate, 33%).

No firm can alter the technological trends that will drive the I/S field in the next ten years. What management can do, however, is to develop corporate policies that bring the skills of their I/S personnel in line with the challenges those trends will pose in the future. The following section considers these technological dynamics in more detail.

The I/S Context

Three "macro-trends" are of particular significance here.* The first is the trend toward distributed processing, which has three

FIGURE 4

CURRENT CAREER PATHS / PROJECTED CAREER PATHS

- modal path
- increasing path
- outlier path

I/S DIRECTOR

SYSTEMS DEVELOPMENT MANAGER

SYSTEMS DEVELOPMENT PROJECT MANAGER

SYSTEMS DEVELOPMENT PROJECT LEADER

SYSTEMS ANALYST

PROGRAMMER

TOP MANAGEMENT

LINE V.P.

STAFF V.P.

STAFF MANAGEMENT

MSS MANAGER

MSS PROJECT MANAGER

MSS PROJECT LEADER

MSS ANALYST

SPECIAL TECHNOLOGIES

STAFF MANAGER

SPECIAL TECHNOLOGIES

STAFF

CAD/CAM

TELECOMMUNICATIONS

OFFICE SYSTEMS

NETWORKS

CNC

USERS
### Job Aspirations: Non-Managerial Respondents

#### Next 3 Jobs

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<tr>
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### JOB ASPIRATIONS: MANAGERIAL RESPONDENTS

**CURRENT JOB**

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<th>I/S Director</th>
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immediate implications for human resource planning. First, business skills become more important since distributed systems are by their nature user-oriented (primarily reflecting the functional needs of a specific user department). Second, technical skills relating to communications protocol, network design and optimization, and routing and switching take on greater importance with the increasing user-orientation of distributed systems. Third, I/S professionals will have to become teachers and consultants and master the interpersonal skills required by those roles.

The second macro-trend is toward packaged/purchased (as opposed to customized) software. As a result, more and more firms will be faced with the option of buying (as opposed to making their own) software. This will result in the increasing standardization of the programming function. Therefore programmers will become easier to train (and to replace), rendering each individual programmer less critical in the corporate I/S environment.

Finally, there is a macro-trend toward end-user computing. Again, this poses three human resource-related issues. To begin with, I/S professionals will come to need as much management acumen as technical expertise. Further, they will need to be familiar with the concrete issues underlying the logical structures (software) they present to end-users. Finally, the raison d'etre of I/S departments/divisions will shift away from automating organizational procedures, and toward enhancing end-user performance -- whatever that may involve.*

Taken in sum, these trends imply the need for I/S professionals to take on many of the tasks of industrial psychologists and organizational behaviorists. They also lead us to draw some more specific inferences about the shape of future I/S career paths and how they might be structured.

To begin with, the career aspirations reported by technical staff and technical staff managers lean heavily in the direction of systems analysis and away from the fields of technological specialization that will come to be increasingly important in the I/S field. We infer that technically-oriented I/S personnel will require some incentives to stay in and develop these special technologies.

By the same token, not enough programmers and analysts are considering special technologies-related career moves. To foster movement in this directions, firms will undoubtedly have to undertake training and education programs that will equip non-technical staff employees with the skills necessary to the special technologies appropriate in any given setting.

Finally, we must conclude once more that there is a glaring gap between the career paths and aspirations of our respondents, on the one hand, and the increase in the importance of the user liaison function and in the sophistication and demands of users themselves, on the other. User-related jobs played minor roles, at best, in the past career paths of our respondents. Given the growing importance of MSS and user involvement in all aspects of I/S, this lack of interest in user-related career moves will soon present problems for I/S directors and managers who seek appropriate skill mixes.
Conclusion:

We arrive at the question, "What is to be done?" The answer must be predicated on an analysis of exactly how the technological dynamics of the field are likely to affect the necessary functions and skill mixes in any given firm. But once having arrived at these projections, what is to be done is relatively straightforward: on the one hand, managements can develop medium- and long-term human resource plans, training programs, and career development programs that will attain the skill mixes they will need to keep up with future technological trends in the field. Alternately, they can count on the I/S labor market to supply the right people at the right time. Given the high and growing demand for I/S professionals of all kinds, and given the discrepancies between current career aspirations and the skills mixes that will be necessary in the future, the "wait and rely on the market" approach seems more than a little short-sighted.

I/S Human Resource Planning is a complex undertaking, and has been dealt with in more detail elsewhere by the authors.* From the standpoint of the I/S department, or of top management in firms that rely heavily on MIS, there will be fewer and fewer logical alternatives as the decade progresses. From the standpoint of the firm, I/S career structuring will be self-evidently necessary in the near future, if it is not so already.

From the stand-point of the I/S professional, career-structuring is innately attractive. It is time to revise the standard view of the I/S professional as a technically-oriented

*Ibid.
loner. In fact, the overwhelming majority of the I/S professionals in all eight job categories (particularly in the non-managerial positions) are very positively inclined toward employer involvement in their career developments. (Again, details on this subject have been covered elsewhere.**) If I/S professionals have appeared to be detached from their organizations and loyal only to their professions per se, one reason may be that top managements have failed to foster career-development programs and company loyalty.

The I/S field is still young. The enigmatic aspects of its technological dynamics continue to baffle users and I/S professionals alike. But without proactive career-development measures, users will find themselves inadequately supplied by their own I/S departments. As a result, they may turn to outside vendors for their I/S products and services. This course of action would reflect the fact that the I/S environment is now demand-driven. As technological possibilities determined probable demand, so demand will determine the supply of I/S products and services. The task within I/S is to structure career paths in such a way as to meet that demand competitively by supplying the user liaison, consulting and special technologies skills demanded by the future.


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