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Barely managing: Attitudes of information technology professionals on management technique

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Abstract

This paper presents findings from exploratory research into the attitudes of information technology (IT) professionals about the role management has played or could play in computing activities. It also looks at the subsidiary questions of what might be desirable preparation of managers for directing IT professionals, what the barriers to this are, and how this preparation might be stimulated. The paper is based on in-depth, ethnographic interviews conducted in 2001 with 30 IT professionals from both public and private sectors in New Mexico.

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1. Introduction

Today, the most important sector contributing to both the economy and government service is information technology (IT).¹ IT has been responsible for the structural shift from manufacturing to services in the American economy (Alberts & Papp, 1997). The IT-producing sector has been growing faster than the economy as a whole (Greenspan, 2000). Diffusion of computer use among IT users and technical innovations by IT producers has accelerated productivity growth during the 1990s (U.S. Department of Commerce, 2000). IT has contributed to growth in demand for labor and an overall skill upgrading in the workplace (Katz, 1999). In the past 20 years, IT has become common in schools, libraries, homes, offices, shops, banking, and retail business. It is no surprise that Drucker (1999) has compared the expansion of IT to the industrial revolution in terms of its impact on American economy and society. IT has provided a large part of the American economic miracle not to mention under girding its global reach.

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However, little is known about IT professionals' views of the significance of technical management. It is especially important since organizations face numerous system problems such as backlogs due to inadequate planning, inaccurate specifications, and poor communication between users and programmers (Dykman & Robbins, 1991; Lieberman, 2000). The Homenet Project found that people had difficulty in understanding and using IT even though it was designed for ease of use (Kraut, Schelis, Mukhopadhyay, Manning, & Kiesler, 1996). Increasingly, organizations are requiring IT professionals who can move beyond being technologically savvy and contribute to the planning and development of technology (Hayes, 2002). Since the 1990s, the Computer Science and Telecommunications Board of the National Research Council has been encouraging interdisciplinary work between computer science and social sciences to assess both the positive and negative impacts of using IT. Yet, most research on the impact of IT has been on bipolar issues such as centralization versus decentralization, upskilling versus deskilling, haves versus have nots, and so forth. To date, little social science research has been done on IT professionals' knowledge of the disciplines of social science outside of their own specialties, and their perceptions of the role, importance, and technology of management.

This paper presents the results of an empirical study of the views of IT professionals with respect to management as an institutional practice and administrative science as a body of knowledge. Defining an IT professional is complicated mostly because IT occupations are not located solely in the IT industry; instead, they are distributed throughout the U.S. economy including industry, government, and nonprofit organizations. Also, many occupations are considered IT work even though they vary enormously in the technical requirements, ranging from data-entry personnel to computer scientists. Further, the U.S. Department of Commerce (1997) includes computer scientists, computer engineers, systems analysts, and programmers in the IT workforce; in contrast, the Information Technology Association of America (1997, 1998), a trade association representing 11,000 companies, includes all those who perform any function related to IT. We limit ourselves to computer scientists mostly because the vast majority of IT jobs are as computer scientists and systems analysts. During the 2000–2010, employment for computer scientists is expected to increase from 697,000 to 1.4 million, while employment for computer system analysts is expected to grow from 431,000 to 689,000 (National Science Board, 2002, p. 3/27).

2. Methodology

The paper is based on empirical research because there is little scholarly work on the views of IT professionals about management or social sciences. In 2001, we conducted an exploratory study using IT professionals from both the public and private sectors in New Mexico. The public sector respondents came from a state research institution and a national laboratory. The private sector respondents came from three companies in the IT sector. We interviewed a total of 30 IT professionals with Ph.D. and Master degrees, 20 from the public sector and 10 from the private sector.

The interviews were structured in the sense that certain issues were covered in every interview. An interview guide containing a list of questions and follow up probes was developed and piloted before being used in this research. Constructs were selected from a prior review

of literature on computer science, management, and the social sciences. The interviews were unstructured in the sense that they resembled a private conversation with subjects. All interviews were held one-on-one with no time limit and in informal settings. This combination of structure and freedom allowed subjects to express themselves in depth, while the interviewer maintained a control over the topics, and explored interesting leads. Accordingly, considerable information was garnered on the respondent's views of the research topics as well as some other related topics.

All interviews were audio recorded with the respondent's signed permission according to Institutional Research Board protocols. Each interview was transcribed verbatim and analyzed qualitatively using a computer aided coding program, QSR NVIVO. This program facilitated theory development from empirical qualitative data through pre arranged and ad hoc coding.

3. Managing IT professionals: a brief review of the literature

IT professionals are concentrated in three main sectors of the economy—industry, government, and education. The private sector is by far the largest provider of IT employment. In 1999, approximately 87% of IT professionals were employed in industry, approximately 8% in the government, and approximately 5% in educational sectors (National Science Board, 2002, p. A3–34). It has been challenging to recruit and keep IT professionals in the public sector. The pay differential between the public and private sectors makes the latter more attractive to many. Median annual salaries of IT professionals in 1999 were \$66,000 for industry, \$56,000 for government, and \$46,000 for educational sector (National Science Board, 2002, p. A3–150).

Frequently, unable to compete on salary, the public sector attempts to attract IT professionals by offering flexibility in work sites and schedules, freedom of expression, and other incentives. For instance, in Arizona an attempt was made to extend a telecommuting program to include IT professionals who might then manage the state's network from their own homes. Similarly, Ohio has tried to speed up hiring processes that could last up to six weeks in an effort to keep workers from being hired away before they start with the state.

Also, the public sector has addressed the salary problem directly where it is able to do so. For example, from 1997 to 2000 Kansas was able to reduce its 33% turnover rate among IT professionals to around 7% by instituting bonuses for critical skills and projects (Cohodas, 2000, p. 74). The Office of Personnel Management has created a new occupational series for IT workers (O'Hara, 2001). In 2001, the National Security Agency outsourced work into the private sector, namely Computer Sciences Corporation and Logicon, which paid comparable salaries and benefits to 750 employees hired (Cahlink, 2001, p. 57).

Many have predicted that the challenge to IT managers in the public sector will become greater and more complex (O'Hara, 2000). A study comparing the public and private sectors found contextual differences, which make IT management a particularly tough endeavor in the public sector such as the high inter-organizational dependence, the greater levels of red tape, the concerns for extra-organizational linkages in information systems, and the lower level of IT managers in the organizational hierarchy in public organizations (Bretschneider, 1990).

In the private sector, many scholars believe that there is an “inherent conflict between managers and professionals . . . a clash of cultures: the corporate culture, which captures the commitment of managers, and the professional culture, which socializes professionals” (Raelin, 1991, p. 1). However, as modern organizations became sites of professional activity, managers have been making important concessions to accommodate professionals; thus, the so-called conflicts between professionals and organizations seem to be overlaid (Meiksins & Watson, 1989; Varma, 1999). Nonetheless, the role differences between managers and professionals within the confines of industrial organizations continue to be apparent.

Generally, managers preserve the integrity of organizations in several ways—by planning the work that needs to be done; determining the work rules and the reward systems; hiring qualified employees; communicating between employees and others; reporting to the top management; budgeting, fiscal planning, and accounting; providing leadership; and maintaining favorable working environment. These are some constant, immutable, and enduring themes in organizational life for which management is responsible (Miller & Cardy, 2000). It is through organizing, reorganizing, structuring, restructuring, adjusting, readjusting, abolishing old rules, and establishing new rules that managers hope to have an impact on the performance of their employees. Effective management is considered one of the keys to success of any organization especially in a rapidly changing IT environment.

Both managers and IT professionals benefit from fulfilling the terms of a psychological contract and employing a “human relations” view, such that regardless of the technological skills that individuals master, interpersonal skills still remain essential in work organizations. In addition, managers foster a sense of community, which is challenging in an IT environment because IT professionals are professionally educated, specialized, self reliant, and often highly competitive (Miller & Cardy, 2000). The tasks of management in this environment, therefore, must be accomplished through creativity, dedication, and innovation. Sharing a clear organizational identity and common values improves performance, increases efficiency, and reduces turnover, among other things (Chatman, 1991; O’Reilly, Chatman, & Caldwell, 1991).

In the classical open-systems approach, environmental inputs are transformed into outputs via the social structures of human behavior. This results in what has become known as a functioning “socio-technical system.” Snell and Dean (1992) adapted open systems theory to the field of human resources by incorporating the “competencies” of individual members into this system. Accordingly, the main task of management is to guide these socio-technical systems combining material inputs, technical skill, social structures, and individual needs to result in the attainment of organizational goals. The prime managerial skills needed to accomplish this are the ability to structure and plan work and the ability to communicate with professional employees.

However, the modern work place, especially the high tech workplace, has altered somewhat the traditional employment of management skills. In the past, managers who lacked communication and planning skills often compensated through iterative face-to-face discussions, requiring team members to come back to them again and again to clarify performance goals or decision-making authority. However, if organizations are to capitalize on the flexibility and speed that are possible through distributed, networked teams, managers and team members have to form clear, upfront agreements regarding performance expectations, the team’s priorities, and how communications are to be carried out among members (Barner, 1996). In those

organizations or units where IT is commonly used for work structures and communication, such as those with a preponderance of IT professionals, a new premium is put on the ability to understand socio-technical systems, resolve conflict over and negotiate plans, and to communicate effectively.

IT professionals have been concerned with both technical developments in information and computing and social changes associated with such developments. They have intense interaction with society in a way many other scientists and engineers do not. The interfaces designed by IT professionals work with people as much as they do other machines. The information IT professionals need to design these interfaces often comes from the people who operate the machines. The systems for which IT professionals design both hardware and software innovations and new automations are very often “socio-technical” systems such as work groups, machine management, or robotics. Thus, IT professionals ought to welcome and take advantage of the existence of those, like social scientists, who specialize in work innovation, social context, as well as organizations.

4. Management of IT professionals: an empirical view

The views of IT professionals about management, managerial skills, and management related tasks have not been examined in the scholarly literature. The interviews with IT professionals, therefore, provide primary data on the subject. Tables 1–3 present responses from two interview groups—public (academics and national laboratory practitioners) and private (industry

Table 1
General views on management in IT

Sector	Comments
Public	<p>Preparation and suitability (25%)</p> <ol style="list-style-type: none"> 1. A certain number of them are eventually going . . . to be in management positions for which they're totally unprepared, and which they get no training whatsoever 2. We had to get another leader in there with some control . . . because this is not my area of expertise . . . all I knew was that it wasn't working 3. We all are doing jobs that we were not trained for in a legal sense or a business sense, or a personnel management sense and we're all making it up as we go all the time 4. US engineers make lousy managers 5. Computer science people are excited about technical things . . . not management things <p>Role of managers (15%)</p> <ol style="list-style-type: none"> 1. As you go up in management . . . you have more of a leadership role within an organization 2. The . . . perception I have is that psychologists deal with individuals, sociologists deal with groups . . . and competent managers . . . put both of those together. . . in some way 3. Management only has the ability to inspect so much, because they don't have the technical expertise
Private	<p>Preparation and suitability (10%)</p> <ol style="list-style-type: none"> 1. Ideally if you had someone who was primarily management, but had a little technical experience . . . they can understand the worker's plight; they'd probably have the best skill set <p>Role of managers (10%)</p> <ol style="list-style-type: none"> 1. The key to good management is pinpointing people's strengths and weaknesses and putting them in a role with the tools that they need to succeed

Table 2
Importance of technical skills for managers in IT

Sector	Comments
Public	<p>Pro (10%)</p> <ol style="list-style-type: none"> 1. We had strategic planning in the department and . . . brought up the idea of getting a facilitator . . . Other people had the attitude . . . we're hard scientists, they're soft scientists . . . what could they know that we don't know . . . cause they're at a lower level 2. The problem is that the people who really understand the social processes deeply do not apply deeper mathematics and computation . . . to their systems <p>Con (5%)</p> <ol style="list-style-type: none"> 1. My manager . . . doesn't know technically what we do . . . and should understand what the goals are but not how to write the computer program
Private	<p>Pro (10%)</p> <ol style="list-style-type: none"> 1. I've got my set of requirements . . . and . . . if I have trouble . . . I go to my supervisor who's another engineer <p>Con (10%)</p> <ol style="list-style-type: none"> 1. Ideally someone who was primarily management, but had a little technical experience . . . and could . . . understand the worker's plight . . . would . . . have the best skill set

Table 3
Importance of human relations skills for managers in IT

Sector	Comments
Public	<p>Pro (35%)</p> <ol style="list-style-type: none"> 1. Social pleasantries . . . make a difference in how much effort people put into a project 2. If I want somebody to do something for me, the worst thing I can do is make them angry . . . right off the bat 3. Usually the ones that don't have . . . work are really hard to get along with. The social stuff can kill a project . . . Dealing with people and personalities . . . is typically the hardest part of what we do 4. In ten years . . . a lot of their job is going to be listening to complaints, problems . . . and getting people to work instead of squabble 5. Human factors issues are so important and I think a lot of computer scientists overlook that 6. If you look at systems . . . it's humans that occupy the biggest part . . . and managing that resource is . . . more important than managing the application <p>Con (5%)</p> <ol style="list-style-type: none"> 1. The only time I've really done anything in the way of discipline I drafted an email on appropriate behaviors
Private	<p>Pro (25%)</p> <ol style="list-style-type: none"> 1. Good program management . . . is . . . somebody who's . . . going to listen to both sides, present the options and mediate 2. I'm project management, because I handle the complaints of the engineers and . . . and take them to the customer and vice versa <ol style="list-style-type: none"> 1. When I . . . pull a team together I have . . . one person . . . that can tell me openly if I'm . . . keeping the team together 2. We're trying to shift the whole organization from a data hoarding to a data sharing . . . mentality <p>Con (20%)</p> <ol style="list-style-type: none"> 1. It's been the direction of my management to tell me to adapt to the user 2. The problem was where the customer . . . didn't know what they wanted and . . . didn't have clear where they were going . . . and we had to repeat work over and over. That was ugly

practitioners). In an effort to get at the respondent's own views, the tables present ideas as quotations taken from respondents. As such, the comments presented in the tables are both illustrative and exhaustive. Where applicable, the comments are classified into categories such as favorable (pro) and unfavorable (con). The percentage of respondents by sector commenting in a category are indicated in a parenthesis next to a category heading to help give an idea of what the strength of this view was by group.

4.1. General view of management's role

As Table 1 shows, there is a clear divergence between the public and private sectors concerning their general views of management. To begin with, the rate of comment for each category was somewhat greater for the public sector IT professionals than for those in the private sector. This difference is most marked in the preparation and suitability category where the public sector IT professionals comment at a rate of over twice that of their counterparts in the private sector, 25–10%. Concerning the role of managers there is less difference with the public employees commenting only slightly more, 15–10%.

The two sectors, however, differ more on the substance of their views. Regarding preparation and suitability, public sector IT professionals do not believe themselves prepared to fill management roles ultimately as indicated by comments 1, 2, and 3. Neither do they see themselves as entirely suitable for such endeavors as revealed by comments 3 and 4. Also, as pointed out by comments 4 and 5, they do not see themselves as particularly well suited to or enthusiastic about such undertakings either. The private sector practitioners are less concerned with their own suitability for management and more concerned with a skill set that is suitable for managing them. They seek understanding and place more value on empathy as a general characteristic of management than they do on either enthusiasm or preparation.

Likewise, the public sector IT professionals see the role of management as somewhat different, as well. As comment 1 shows, they see leadership as something that occurs in the upper reaches of the institution and that does not affect them directly. This may be in keeping with the tendency to organize IT professionals into teams at the design and implementation level where leadership may change depending upon the project. However, comments 2 and 3 indicate that public sector IT professionals focus on technical expertise in management whether it is the combination of social science skills mentioned in comment 2 or the recognition of information asymmetry between managers and designers as indicated in comment 3. This point of view differs somewhat from that of the private sector respondents, which emphasizes the developmental role of managers rather than the technical role.

With respect to the preparation and suitability of people for management in the IT field, respondents point up two things. First, there is a clear belief among the public sector IT professionals that management itself is a specialized enterprise that benefits from training and experience and that takes expertise for success. In short, it is perceived as a technical field although not a "high tech" one. Second, there seems to be recognition that it is inevitable that some of the practicing public sector IT professionals will become managers even though they are not particularly well prepared or suited to do so. Concerning the role of managers, it should be emphasized that the public sector IT professionals do not seem to see a prime responsibility of managers as that of finding suitable niches for their employees and developing them. This runs

counter to some contemporary management wisdom. Rather, they see managers as those who are specialists in a body of knowledge or technique like themselves—sort of an administrative sciences point of view.

4.2. Importance of technical skills for managers

Table 2 looks at comments concerning the necessity of computer technical skills for effective management of IT professionals. Interestingly, the strength of comment – as revealed by the percentage of respondents – does not vary much between sectors. The comments on Table 2 consist of not only positive comments concerning technical skills but ones that reveal the attitude of IT professionals concerning the relative importance of technical versus management skills. Attitudes between sectors do not differ greatly on either the pro or con categories. They are about evenly split in favoring technical versus managerial skills. Both public and private sector IT professionals see technical expertise as important for computer science management, though not very strongly. However, they do differ in their attitudes about the efficacy of management skills. Among those public sector respondents who favor technical skills for computer science managers, comments 1 and 2 indicate that at least some public sector IT professionals give more respect to mathematical and scientific knowledge than to management skills.

In fact, these comments reveal that those who favor technical skills for managers also have considerable disdain for management itself as an endeavor. This theme was reflected in the discussion above where even positive views of management are based on a perception of it as being a technical or scientific field. Accordingly, there seems to be an emphasis on the scientific among the public sector IT professionals that cannot be ignored. In contrast, those private sector respondents who favor technical skills for managers do not reveal this bias; rather, they are more matter of fact about the need for technical guidance.

With respect to those respondents who do not see technical skills in computer science as essential for managers, there is almost no difference across sectors in either strength or perception. Both public and private sector IT professionals view technical expertise as secondary to management skills for success. As indicated by comment 1 for the public and private sector con category, neither set of respondents perceives as most important a full understanding by management of their technical work, but rather places more value on the understanding of goals and situations.

4.3. Importance of human relations skills for managers

Table 3 presents comments from the computer science respondents concerning another dimension of management skills that might be contrasted with technical ones, that is, human relations skills. The responses broke down neatly into two categories—those favorable (pro) to human relations skills for computer science managers and the second those unfavorable (con).

As Table 3 makes clear, there are both similarities and differences between the two sectors. They are somewhat similar in strength of response for those favoring human relations skills for managers although the public sector IT professionals hold this view somewhat more strongly

than do the private sector IT professionals at 35–25%. Along these lines, the public sector IT professionals are less unfavorable to the idea than are those in the private sector at 5–20%.

However, the respondents in the two sectors differ a bit on the substance of their views on human relations skills for management. Regarding their favorable views on human relations skills, public sector IT professionals focus on interpersonal communication and interaction as indicated by comments 1 through 5. These comments focus on the difficulties those individuals in team situations have collaborating and getting along rather than competing and fighting. In addition, the idea of management as a technical endeavor – even concerning human relations skills – also is present in these responses as evidenced by comments 6 and 7. Though both of these comments are distinctly favorable towards human relations skills, they have a scientific focus concentrating on human “factors” and “systems.”

By contrast respondents from the private sector that favor human relations skills for managers have a different emphasis for those skills. As comments 1 and 2 show they are more concerned with mediation and interpretation between organizational levels and specialties than they are resolving interpersonal conflict. Also, as revealed in comments 3 and 4, they are more attentive to opportunities for creating structures and practices that open up communication broadly whether this is for sharing knowledge or for feedback. In short, the private sector respondents are more focused on practice than personality.

Nevertheless, in the area of practice the two sectors are quite similar when they do not see human relations skills as important for IT professionals. As comment 1 under con for the public sector respondents reveals, some, even when trying will not get the importance of human relations skills—no matter how well written, e-mail cannot substitute for face to face communication. As comment 1 for the private sector shows, some feel direction is more important than feedback, whereas others, as indicated by comment 2 do not understand the role of feedback and mediation in getting clear on directions.

Taken together these comments suggest that public sector IT professionals understand the importance of human relations, but equate it with reducing difficulties in and working on the technical structure of interpersonal relations. They do not seem attuned to iterative processes such as mediation and feedback or creative processes such as interpretation. In short, they are conscious of only one aspect of the “relations” part of human relations.

5. Discussion

The public sector IT professionals interviewed do not seem to see the facilitative role that managers can play in both teams and organizations in structuring work, setting standards, and negotiating operating ground rules for projects. Instead, they primarily view them as resolving interpersonal conflict—serving as the “grown up” that can make everyone play together. Part of this view may be ascribed to the nature of the institutions in which public sector IT professionals’ work. Typically, they are large and bureaucratic with work teams at the operating level but bureaucratic hierarchy above. Accordingly, most conflicts occur at the operating level and with a flatter authority structure it is hard to resolve without resorting to an upward appeal to authority. In addition, they need to understand the developmental role of managers in an organization. Managers not only structure work, but they help develop

employees by finding suitable tasks and assignments in which they can succeed. Again, the nature of the working environment of IT professionals – competitive, pressured – may blind them to this reality.

However, an expanded view of management's role is important for two reasons. First, in order to become effective, managers need to have an appreciation of the things that managers can do well and that make a difference. Otherwise, they have no concept of becoming effective in this role, even if trained to do certain things. Second, an improved perception of management might help to recruit those with such skills into the management ranks. Otherwise, only those who are most successful technically may see themselves as the natural choices for these positions.

Second, IT professionals' views of management technique need to be augmented resulting in a greater appreciation for the skills and abilities that successful managers do have. The understandable devotion by IT professionals to mathematics and the scientific method results in disdain for knowledge or skills not produced in this way. It is important that IT professionals understand that innovations that may make their work life better – flexible work hours, broadband classification, teaming approaches – are not designed, piloted, and implemented by scientists but by managers.

Moreover, the IT professionals need to understand that these innovations are based on systematic study that produces knowledge resulting in technique. Clearly, this is not science, but is worthy of some respect. This is not to suggest that management should become more "scientific." Rather it suggests that there needs to be a way to create more respect for other skill sets among the IT professionals themselves. If this is not done, then not only will the divide between the managers and the managed endure, but the IT professionals will not be able to participate effectively in the design of innovations to manage their own work.

Third, an understanding of the balance between the social and the technical – the concept of socio-technical systems – needs to be engendered among IT professionals. This sort of idea might help them both to address concerns outlined above and to put them together in a manageable conceptual package. Also, it might aid in understanding the importance of management as a career choice. Interestingly, not a single respondent was able to identify or define the term "socio-technical system" correctly. However, their attempts to define it yielded some comments that further illustrate the attitudes of a segment of IT professionals concerning such concepts or knowledge that are not viewed as mainstream scientific. As one said, "It'd be nice to know what it describes." Another echoed, "Well, that's something that is difficult to pronounce." Another declared, "Not really, but it sounds like something that might appear in a techno-babble paper."

In sum, it is important for IT professionals to have a better understanding of management. It is essential if they are to help in designing work and pay arrangements that maximize their own satisfaction and the satisfaction of other IT professionals like them. Otherwise, the public sector will continue to lose the most entrepreneurial of these professionals to the private sector. Moreover, if public sector IT professionals cannot see the role of management as less bureaucratic and marginal and more creative and essential as do their private sector counterparts, they will continue to lose jobs to outsourcing in the private sector. This will occur because management of IT endeavors in the private sector and thus the work environment itself will be more effective. If IT professionals are to be encouraged and enabled to stay in the public sector, the best and brightest among them must help in managing these problems themselves.

Note

1. IT is not a single technology; instead, it is a combination of four basic technologies: tools to access information, telecommunications linkages (including networks), information processing hardware and software, and storage media (Keen, 1995). The foundation of IT is the ability to represent text, data sound, and visual information digitally.

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