Perceived Importance of Systems Analysts' Job Skills, Roles, and Non-Salary Incentives

By: Gary I. Green
Department of Computer Information Systems and Production Management Boise State University Boise, Idaho 83725

Abstract

System analysts are service providers who are required to work closely with users for the purpose of defining, developing and implementing computer-based systems. Analysts and users in private organizations may have different expectations and proficiencies than those in public organizations, in part due to the types of applications required. Beliefs about how others are supposed to perform and what motivates them contribute to a variety of behavioral responses. Conflict between analysts and users may have serious consequences that can be very costly, such as poorly developed systems, behavioral dysfunctions (e.g., mistrust, avoidance, rejection), and negative user satisfaction. An interesting research question is whether perceptual differences exist among systems analysts and users about how systems analysts perform their jobs, as well as whether the perceptions are the same for public and private organizations. In a survey of perceptual differences about job skills, job roles, and non-salary incentives of systems analysts, results from 872 questionnaires show that analysts and users differ significantly in their perceptions of skills and roles for systems analysts. Public and private systems analysts and users differ significantly on perceptions of all three measures. The results provide evidence that analysts, more so than users, recognize the importance of behavioral skills for effective development. This difference may be a major source of conflict, with users expecting analysts to exhibit technical skills in situations where behavioral skills are required. Public and private sector differences suggest that even though the process of systems development may be very similar, users and analysts in public organizations may, in fact, be different than their counterparts in private organizations. An exploration of these sector differences should be addressed by future research. Information systems managers may use the results to guide educational programs for users, develop better assessment measures for analysts, and establish better mechanisms for providing important non-salary incentives for analysts.

Keywords: Systems analysis, systems analysts, users, perceptions, public and private organizations.

ACM Categories: D.2.9, K.6.1

Introduction

Systems development efforts depend to a large degree upon how well systems analysts and users work together (Kaiser and Bostrom, 1982). The relationship between analysts and users could translate directly to success or failure of major development projects (Lucas, 1975) and indirectly to job-related stress (Ivancevich, et al., 1983) and dissatisfaction (Woodruff, 1980). The most critical stage for analyst and user interaction occurs in the problem definition and requirements stage (Land, 1982). Analysts and users typically work on requirements within a project team structure. Research evidence suggests that users should be actively involved during the initial phase of the development process to have successful implementation (Baroudi, et al., 1986; Ginzberg, 1981; Lucas, 1975; Welke and Konsynski, 1982). Without user involvement, there is a strong possibility that users would resist implementation efforts (Argyris, 1971; 1982) or even reject the imposed system (Bostrom and Heinen, 1977; Lucas, 1975; Markus, 1984).

Problems that result from this interaction between these two diverse groups have been recognized widely and researched. In its simplest formulation, the problem involves effective communication (Bostrom and Heinen, 1977; Cheney and Dickson, 1982; Cheney and Lyons, 1980; Doll and Ahmed, 1983; Guinan and Bostrom, 1986; Ives and Olson, 1984). In its more complex form, the problem involves conflict (Robey and Farrow, 1982), power (DeBrabander and Thiers, 1984; Olson and Ives, 1982), role playing (Goldstein and Rockart, 1984), productivity
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(Green, et al., 1985), design procedures (Boland, 1978), and the behavioral effects of satisfaction (Woodruff, 1980) and attitudes (Kaiser and Srinivasan, 1982).

A potential cause of some problems between the two groups could be attributed to perceptual differences. Sound theoretical models have been proposed that link perceptions of job tasks, cues from social interaction in performing job tasks, and affective and behavioral responses (Griffin, et al., 1987). Job characteristics could be differentiated by the skills required to perform tasks, roles necessary to carry out tasks, and incentives (other than salary) for task performance. Individuals from one group, such as systems analysts, may perceive the job of systems analysis differently than individuals from another referent group, such as users. Gingras and McLean (1982) find significant perceptual differences between users and systems analysts with respect to their profiles of the users within a large firm. Perceptual differences, if they exist, could affect behavior. As Watson (1982) states:

The evidence gathered to date strongly indicates that people tend to attribute more importance to traits than to situations and that this tendency holds regardless of whether they are analyzing their own or another's behavior (p. 688).

The analyst needs certain technical and behavioral skills to conduct systems development (Vitalari, 1985). In the process of conducting systems development, the analyst will play several roles, each requiring a different behavioral set of actions and responses (Cheney and Lyons, 1980; Goldstein and Rockart, 1984). The motivation for undertaking systems tasks and performing those tasks at some level of proficiency is related to incentives for doing the job. The skills, roles and non-salary incentives of analysts performing their job function, to a large degree, characterize the task environment of systems development.

How analysts and users, as two different groups, perceive the task environment of systems analysts has not been addressed adequately in prior research. This study is concerned with perceptual differences of analysts and users about the skills, roles, and non-salary incentives of analysts performing their job function.1

A secondary research interest is the comparison of perceptions by analysts and users from public and private organizations to determine whether perceptual differences, if they exist, are dependent upon whether the organizations are public or private. Motivation for investigating sector differences stems from three observations. First, application programs in the public sector are principally either mandated or budgetary in nature. Private sector applications are more diversified and include transformation processes and competitive analysis, which are largely excluded in the public sector. Second, the private sector user community generally includes more functional areas (such as research and development, marketing, distribution, and production) than the public sector. Third, systems analysts in the private sector appear to have better training, salaries, and computer resources.

**Background**

Related research has reported on the topics of skills, roles, non-salary incentives, and differences between public and private organizations. The skills analysts need to develop computerized systems may be categorized as either behavioral or technical (Arvey and Hoyle, 1974; Benbasat, et al., 1980; Vitalari, 1985). Cheney and Lyons (1980) investigate the comparative ranking of 25 different behavioral and technical skills for information systems professionals, including systems analysts, and find that behavioral skills are rated as "very important." Arvey and Hoyle (1974) identify specific skill groups required of systems analysts, including maintaining user relations, communications, presentations, design and analysis, and technical knowledge. The most comprehensive study of technical skills for systems analysts was completed by Vitalari (1985), who identifies 23 specific skills categorized by organizational-specific knowledge, applications domain knowledge, functional domain knowledge, and technical skills. However, all analyst skill studies, according to Vitalari, show that behavioral skills are perceived more importantly than technical skills for performance by both systems analysts and users.

1 Salary and salary-related benefits were not included in this study by design. Salary to some degree represents equity, status, and achievement. This study was designed to elicit perceptual differences about what motivates or drives behavior in a work-related, social interaction. However, the salary variable could have a confounding effect on perceptions of non-salary incentives, and this relationship could be explored in a future investigation.
Perception of what roles individuals should assume can influence behavior. Roles are learned behaviors and patterns of actions in social situations (Sarbin and Allen, 1968). If analysts and users perceive the roles of systems analysts to be the same, then the expectations for behavior should be congruent. If perceptual differences exist about the roles analysts assume, then these different expectations could result in behavioral dysfunctions. Very little reported empirical research has dealt specifically with roles for systems analysts.

Attribution theory accounts for individuals ascribing causality for behavior based upon beliefs and expectations (Kelly and Michela, 1980). Beliefs about what motivates others is an important basis for behavior, and perceptions about non-salary incentives for systems analysts to carry out their assigned tasks is a contributing factor for gaining an understanding of expectations and resulting behavior. There has been some related prior work on the motivation of information systems professionals. In a study by Robey and Markus (1984), it was reported that analysts act in their own self interest when working with user groups. If users perceive analysts to be motivated by factors other than providing the best possible service, then perception could affect the interaction between users and analysts. Factors such as politics, self-serving achievement, and cover-up protection of errors could lead to distrust and suspicion. In another study, Couger, et al., 1979, observe motivational differences between information systems managers and user managers for social need (analyst low) and growth need (analyst high). Similarly, analysts may not feel a high need for social interaction.

Public vs. private organizations

Comparisons of public and private organizations have found differences due to the organizational culture, such as political role and more external control (Rainey, 1983; Rainey, et al., 1976). For example, managers in public organizations experience less satisfaction in their work and lower organizational commitment than their counterparts in private organizations (Buchanan, 1974; Lachman, 1985; Rhinehart, et al., 1969). Lachman (1965) claims that much research involving comparisons of public and private organizations does not control for the task environment. However, the process of systems development represents a consistent task environment that should be applied the same way regardless of whether an organization is public or private. Each project should follow the same stages of development, starting with problem definition and requirements and ending with implementation, as reported in the literature (Green, et al., 1985; King, 1984).

Mansour and Watson (1980) compared private and public organizations for information systems performance differences over a number of variables. Their study includes hardware, software, behavioral, structural, and environmental variables. The study concludes that: "Governmental organizations function in an environment that is much different from that faced by private business organizations" (p. 525). Their results show computer hardware and software variables to be the only common variables utilized to measure performance. This suggests that both public and private organizations should be concerned with the process of systems development and the performance of that process. Henderson and Schilling (1985) argue that model aids for the decision-making process are different for public organizations principally due to conflicting objectives and the types of data analysis undertaken. This would imply that user requirements, as well as user expectations, may be different.

Hypotheses

There are two sets of hypotheses for this study. The first set predicts that users and analysts will differ in their perceptions about the importance of factors involving the systems analyst's job function. This set of hypotheses is based on arguments that analysts and users are from two different populations, that they have different sets of expectations about the systems development process, and that they have different degrees of involvement for the various stages of systems development. The first set of hypotheses states that:

H1: Systems analysts and users differ in their perceptions of importance of skills that systems analysts should exhibit in performing their duties.

H2: Systems analysts and users differ in their perceptions of importance of roles that analysts should display in performing their duties.
H3: Systems analysts and users differ in their perceptions of importance of non-salary incentives that analysts should receive in performing their duties.

A second set of hypotheses tests for differences based on whether an organization is public or private. The task of systems development is presumed to be the same across organizations and organizational functions. Surprisingly, reported research on the comparisons of systems analysts and users for public and private organizations is almost non-existent. An assumption may be made that individuals who work as analysts in the private sector may have better resources available, have more training opportunities, and may be more skilled than their public sector counterparts (Matherly and Stepina, 1985). If this assumption is correct, then there should be differences of perceptions between analysts and users. For managers of systems analysts in public organizations issues such as job security and turnover, satisfaction with opportunities for professional growth using new technologies, and ability to attract qualified candidates may be of greater concern. Users within public organizations could differ in qualifications and career aspirations from users in private organizations. The following three hypotheses deal with these comparisons.

H4: Systems analysts and users in public organizations differ from those in private organizations in their perceptions of importance of systems analysts' skills.

H5: Systems analysts and users in public organizations differ from those in private organizations in their perceptions of importance of systems analysts' roles.

H6: Systems analysts and users in public organizations differ from those in private organizations in their perceptions of importance of non-salary incentives for systems analysts.

Method

Procedure and measures

The instrument utilized in this research was developed through two pilot studies and associated interviews with both systems analysts and users. Care was taken to ensure a high level of internal validity, as suggested by Jarvenpaa, et al. (1985). The purpose of the first pilot study was to develop a research instrument; it consisted of two parts: structured interviews and questionnaire completion. Structured interviews of 26 systems analysts experienced in working with users from four different organizations (a large computer manufacturing firm, a full-service financial institution, a utility, and a large electronics manufacturing firm) were conducted by the researchers to establish a detailed listing of behavioral and technical skills necessary to accomplish systems development. In part, the interview questions addressed some of the issues stemming from prior research on specific task skills (Arvey and Hoyle, 1974; Cheney and Lyons, 1980; Goldstein and Rockart, 1984). The interviews averaged one hour in length. A new questionnaire instrument was developed based on an assessment of the structured interview content.

All items on the questionnaire were ordered randomly within each section. In all cases a seven-point Likert scale was employed with 1 = very unimportant and 7 = very important. Instructions requested participants to indicate how strongly they believed the skills, roles, and non-salary incentives were for systems analysts in systems development. As a second part of the first pilot, the questionnaire was administered in a controlled setting (conference room) to the same systems analysts that participated in the structured interviews. Each group participated in a debriefing. The questionnaire was revised based on the debriefings.

The instrument contains: 21 skills (diplomacy; interviewing; directing; patience; assertiveness; leadership; programming; speaking; writing; listening; empathy; sales; politics; management; training; cooperation; functional application knowledge; organizational communication; analysis and design; non-verbal communication; sensitivity); 20 job roles (intermediary; facilitator; change agent; programmer; detective; designer; developer; diplomat; researcher; communicator; service provider; manager; salesperson; director; scheduler; consultant; and trainer); and 10 non-salary incentives (knowing work is high quality; a feeling of challenge; making friends on the job; promotion to the next higher level; personal growth and development; getting along well with others; avoid-
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The constructs of skills (with 21 items), roles (20 items), and non-salary incentives (10 items) represent the dependent variables.

Thirty organizations from each grouping were selected randomly from the Fortune 500 Industrials, Fortune 500 Financial, 50 state governments, and 100 largest U.S. cities. A variety of directories provided the name and title of the highest ranking executive in charge of CIS for each organization. A personal phone call was made to each executive in the order of the random selection until the target number of 15 organizations in each category agreed to participate. The purpose of the call was to request support for the research project (i.e., an agreement for that organization to participate). The researchers requested that each organization assign (on a voluntary basis) 10 systems analysts and 10 users with appropriate experience (as operationally defined above) to complete a brief questionnaire in a controlled environment (such as a conference room or learning center). The selection of who was to participate within each organization was not made by the researchers but rather by the executive (or a designated subordinate).

The final sample consisted of those organizations that agreed to participate in the study: 17 city governments, 18 state governments, 19 industrial firms, and 16 financial firms. A total of 52 organizations out of 70 that agreed to participate actually participated (74.3 percent organizational participation rate). The participating organizations included 9 city, 15 state, 18 industrial, and 10 financial organizations.

Questionnaires were mailed in groups of 20. Self-addressed return envelopes for each questionnaire and a large self-addressed stamped envelope, capable of containing all 20 questionnaires and envelopes, were enclosed. A script was also enclosed with instructions for administering the questionnaire. The instructions for the questionnaire guaranteed strict confidentiality and anonymity. Each subject sealed the questionnaire in the return envelope and either mailed it back.
### Table 1. Definition of Behavioral and Technical Skill Requirements for Systems Analysts

<table>
<thead>
<tr>
<th>Skill</th>
<th>Definition on Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diplomacy</td>
<td>Being able to say “no” without being too blunt; displaying tact in dealing with others.</td>
</tr>
<tr>
<td>Interviewing</td>
<td>Asking the right questions in order to obtain the information needed.</td>
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<tr>
<td>Directing</td>
<td>Giving instructions and communicating user requirements to programming and support staff.</td>
</tr>
<tr>
<td>Patience</td>
<td>Continually refining user requirements by requesting feedback; tolerating lack of computer literacy and specificity.</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>Insisting on a course of action or what one believes in, even though it may be unpopular.</td>
</tr>
<tr>
<td>Leadership</td>
<td>Getting work done while keeping the team satisfied; effectively giving rewards and punishment.</td>
</tr>
<tr>
<td>Programming</td>
<td>Converting system specifications into effective and efficient computer code.</td>
</tr>
<tr>
<td>Speaking</td>
<td>Presenting your ideas in a manner easily understood by your audience, both in group meetings and person to person.</td>
</tr>
<tr>
<td>Writing</td>
<td>Preparing written documents that accurately communicate ideas in a manner that is easily understood by intended readers.</td>
</tr>
<tr>
<td>Listening</td>
<td>Paying attention to and concentrating on what is being said, and asking questions that refine points about which one is uncertain.</td>
</tr>
<tr>
<td>Empathy</td>
<td>Being able to understand how others feel; accurately determining what someone else thinks about an issue.</td>
</tr>
<tr>
<td>Sales</td>
<td>Promoting the system you advocate; persuading others to accept your viewpoint.</td>
</tr>
<tr>
<td>Politics</td>
<td>Understanding what motivates individuals; determining sources of power and influence in an organization.</td>
</tr>
<tr>
<td>Management</td>
<td>Planning, organizing and controlling projects so that they get done on schedule and within budget.</td>
</tr>
<tr>
<td>Training</td>
<td>Educating users and other non-technical groups on the capabilities of computers and systems.</td>
</tr>
<tr>
<td>Cooperation</td>
<td>Working with others productively; resolving conflict in an effective manner.</td>
</tr>
<tr>
<td>Functional</td>
<td>Sufficiently knowing what the user’s functional application entails to accurately interpret what he or she really needs.</td>
</tr>
<tr>
<td>Application</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
</tr>
<tr>
<td>Organizational</td>
<td>Having a broad view of company goals and operations; knowing the orientation of senior management.</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>Analysis and</td>
<td>Translating user requirements into functional systems specifications.</td>
</tr>
<tr>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>Non-verbal</td>
<td>Reinforcing the message to others through gestures and facial expressions.</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>Being aware of the implications of design and change for the user community.</td>
</tr>
</tbody>
</table>
directly or placed it in the large envelope. A majority of subjects chose to place their sealed envelopes in the large envelope for a group return mailing.

The self selection in this study raises some interesting methodological considerations, as well as potential bias. For example, users may have represented one particular functional area within each organization. There may be differences among the user population that could stem from the functional specialty of the users. For example, those in the finance and accounting areas may have different perceptions and expectations than those in other areas such as marketing or personnel. Differences, if they exist, may be related to training, education, and extent of required computer applications to perform the job function. This area of job function was not included in this study, but is an area that should be addressed in future work. Also, the information systems executive (or appointed subordinate) may have selected users who were known to be more favorable to the systems group. The research ideally would have utilized all employees in each organization to serve as a population for random selection, although this would have proven to be impractical and most difficult to implement. Nonetheless, with the large sample size and variety of organizations, the potential for a serious bias is reduced.

A total of 872 questionnaires was returned from the participating organizations for an 83.3 percent response. The returns were composed of 246 analysts in the private sector, 225 analysts in the public sector, 207 users in the private sector, and 194 users in the public sector. A number of individuals did not return the questionnaire, and this differed by USERDP classification, with 77.1 percent of the users responding compared with a 90.6 percent response rate for systems analysts.

Respondents were mostly male (69.9 percent) and were on the average 38.61 years old with a range of 20-64 years and a standard deviation of 8.65 years. The respondents were well-educated, with 35.1 percent have completed college and an additional 18.3 percent having completed a graduate degree program. An additional 22.8 percent reported some college-level work. The average time spent with their organization was 10.21 years, with a range of 1-38 years and a standard deviation of 7.59 years. Most of the users had a job function of manager (154) or professional staff (115), although 68 were supervisors and 30 were executives. Thirty-two users were classified as "other." Most of the systems staff were analysts (287) or project managers (163) with 21 classified with other job titles.

The demographics by SECTOR indicates that private-sector participants compared to public-sector participants were slightly younger (average age 37.73 years versus 39.63 years) and received more formal education (37.7 percent graduated college and 21.2 percent had an advanced degree versus 32.4 percent college graduates and 15.3 percent graduate degrees). Both private and public sector participants had the same amount of longevity (10.15 years versus

<table>
<thead>
<tr>
<th>SECTOR Main Effects</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USERDP Main Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1. The 2 x 2 Experimental Design**
10.27 years); however, public sector systems analysts had more experience in data processing (13.21 years versus 11.68) and in their current job function (4.92 years versus 3.54 years). The demographics by USERDP indicates that users compared to systems analysts were slightly older (39.63 years old versus 37.73 years old); had more longevity with their organizations (11.73 years versus 8.89 years); had more graduate degrees (22.4 percent versus 15.4 percent) but less college degrees (31.7 percent versus 37.6 percent); and had more females (32.6 percent versus 28.1 percent).

Results

Testing of the hypotheses

To summarize the first set of three hypotheses states that systems analysts and users differ in their perceptions of importance of skills (H1), roles (H2), and non-salary incentives (H3). The second set of hypotheses states that systems analysts and users in public organizations differ from those in private organizations in their perceptions of importance of systems analysts' skills (H4), roles (H5), and non-salary incentives (H6). The dependent variables for the construct skills includes 21 items, for roles 20 items, and for non-salary incentives 10 items, as discussed above. The hypotheses were tested at the .05 level of significance by simultaneously studying the relationship of variances between the independent variables, the groupings of users and systems analysts (USERDP) and public and private organizations (SECTOR), and all of the dependent variables for each construct. This statistical procedure, multivariate analysis of variance (MANOVA), provides useful information about the significance of the main effects (the independent variables SECTOR and USERDP). If a main effect is significant, then further statistical tests would be warranted to determine which specific dependent variables account for the difference.

Table 2 presents the overall results of the tests of significance for the main effects of the six hypotheses tested. The USERDP and SECTOR columns of the table represent the independent variables of the study (main effects). The rows of Table 3 represent the set of dependent variables of skills, job roles, and non-salary incentives. The interaction effects of USERDP by SECTOR also are shown in Table 3 but were not included in the hypotheses of this study because there is little theoretical basis for considering interaction. The only significant interaction effect (skills) will be discussed below for purposes of better clarifying the main effects.

A significant difference in perceptions exists between analysts and users for skills (H1) and job roles (H2), as shown in Table 2. However, there are no differences between analysts and users in the perceived non-salary incentives (H3). Significant differences in perceptions between public and private sector participants were observed for skills (H4), roles (H5), and non-salary incentives (H6). Thus, all hypotheses of this study are supported except for the perceptions of the importance of non-salary incentives by systems analysts and users. The results suggest that analysts and users have different perceptions and that analysts and users in the public sector have different perceptions than those in the private sector. Mean values for each set of dependent variables of the supported hypotheses are shown in Figures 2 through 6 below. These figures display the similarities and differences in perceptions for each dependent variable by analysts and users and private and public sector organizations.

Significance of dependent variables

Further statistical analysis was conducted to test the significance of each dependent variable for skills, roles, and non-salary incentives for the main effects. Analysts and users differ statistically in their perceptions of the relative importance of the following skills: diplomacy, directing, assertiveness, programming, speaking, sales, politics, and non-verbal communication.

4 Kirk (1962) states that interpretation of main effects where interaction occurs should be approached with some caution. However, according to Neter, et al. (1985): "The determination of whether interactions are important or unimportant is admittedly sometimes difficult. This decision is not a statistical decision and should be made by the subject area specialist (researcher)" (p. 680).

5 For all significant MANOVA effects, univariate tests were conducted using an experiment-wise error rate accounting for additive inequality of the appropriate number of contrasts with the Dunn's procedure (Kirk, 1982).
Table 2. MANOVA Summary Table for Skills, Job Roles, and Non-Salary Incentives

| Source of Variation | USERDP | | | SECTOR | | | | USERDP x SECTOR | | |
|---------------------|--------|--------|--------|--------|--------|--------|--------|-----------------|--------|--------|--------|--------|
|                     | df     | F      | p      | df     | F      | p      | df     | F      | p      | df     | F      | p      | df     | F      | p      | df     | F      | p      |
| Skills (N=864)      | 21,840 | 10.39  | 0.0001 | 21,840 | 5.02   | 0.0001 | 21,840 | 1.81   | 0.0146 |        |        |        |        |        |        |        |        |
| Job Roles (N=835)   | 20,812 | 11.67  | 0.0001 | 20,812 | 6.27   | 0.0001 | 20,812 | 1.56   | 0.0569 |        |        |        |        |        |        |        |        |
| Incentives (N=858)  | 10,845 | 1.42   | 0.1683 | 10,845 | 3.29   | 0.0003 | 10,845 | 1.83   | 0.0517 |        |        |        |        |        |        |        |        |

Skill Variables

- Diplomacy
- Interviewing
- Directing
- Patience
- Assertive
- Leadership
- Programming
- Speaking
- Writing
- Listening
- Empathy
- Sales
- Politics
- Management
- Training
- Cooperation
- Appl Know
- Org Comm
- Anal Dsgn
- Nonverbal
- Sensitivity

Figure 2. Means of Skill Variables for Analysts and Users (Private and Public Sectors Combined)
### Table 3. Results of the Tukey-Kramer (TK) Test on Contrasts of Significant Main Effects for Dependent Variables (a = .05)

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>USERDP</th>
<th>SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Users</td>
<td>Analysts</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>n</td>
</tr>
<tr>
<td>Skills:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diplomacy</td>
<td>5.3528</td>
<td>394</td>
</tr>
<tr>
<td>Directing</td>
<td>6.3604</td>
<td>394</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>4.6015</td>
<td>394</td>
</tr>
<tr>
<td>Programming</td>
<td>5.3756</td>
<td>394</td>
</tr>
<tr>
<td>Speaking</td>
<td>5.7665</td>
<td>394</td>
</tr>
<tr>
<td>Sales</td>
<td>4.5076</td>
<td>394</td>
</tr>
<tr>
<td>Politics</td>
<td>4.5254</td>
<td>394</td>
</tr>
<tr>
<td>Training</td>
<td>5.5666</td>
<td>413</td>
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<tr>
<td>Org. Communic.</td>
<td>5.2736</td>
<td>413</td>
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<tr>
<td>Analy. &amp; Design</td>
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<td></td>
</tr>
<tr>
<td>Non-Verbal Comm.</td>
<td>3.7538</td>
<td>394</td>
</tr>
<tr>
<td>Job Roles:</td>
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<td></td>
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<tr>
<td>Change Agent</td>
<td>4.4763</td>
<td>380</td>
</tr>
<tr>
<td>Programmer</td>
<td>4.4868</td>
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<tr>
<td>Designer</td>
<td>6.2643</td>
<td>401</td>
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<tr>
<td>Developer</td>
<td>6.0299</td>
<td>401</td>
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<tr>
<td>Trouble Shooter</td>
<td>5.5910</td>
<td>401</td>
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<tr>
<td>Documenter</td>
<td>5.3915</td>
<td>401</td>
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<tr>
<td>Diplomat</td>
<td>4.8421</td>
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<td>Researcher</td>
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<td>Communicator</td>
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<td>Service Provider</td>
<td>5.7905</td>
<td>401</td>
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<tr>
<td>Salesperson</td>
<td>4.1895</td>
<td>380</td>
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<tr>
<td>Incentives:</td>
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<td></td>
</tr>
<tr>
<td>Making Friends</td>
<td>4.0634</td>
<td>410</td>
</tr>
<tr>
<td>Getting Along</td>
<td>5.3024</td>
<td>410</td>
</tr>
</tbody>
</table>
Public and private sector respondents differ in their perceptions of the following skills: programming, training, organizational communications, and analysis and design.

Significant job role differences exist for USERDP and SECTOR groupings. Analysts and users view certain roles (change agent, programmer, diplomat, researcher, communicator, and salesperson) of systems analysts differently. Those in public and private organizations perceive the programmer, designer, developer, trouble shooter, and documenter roles differently. Univariate tests on non-salary incentives by SECTOR, indicate a significant result for the dependent variables “making friends on the job” and “getting along well with others.”

A significant interaction effect (USERDP by SECTOR) for skills results in only two significant univariate tests: diplomacy (SS = 14.24; F = 11.87; p = 0.0006) and programming (SS = 24.20; F = 9.54; and p = 0.0021). Users and analysts in the private sector differ in their perceptions from users and analysts in the public sector for both diplomacy and programming, as shown in Figures 7 and 8. Users in public organizations differ from users in private organizations in perception of relative importance of diplomacy. (See Figure 7.) Analysts in private organizations have a great difference from analysts in public organizations in perceptions of importance of skills. (See Figure 8.)

A potential explanation to account for perceptions of systems analysts for private organizations differing from those of public organizations may be related in part to levels of bureaucracy (diplomacy variable) and to the types of resources available (such as code generators) for levels of coding (programming variable). These
issues should be addressed in further research comparing public and private organizations.

Interpretation of significant differences of skills, roles, and non-salary incentives is facilitated by additional statistical analysis. Therefore, appropriate comparisons of means were performed to permit an interpretation of the direction of differences. Mean values are reported for the three major sets of applicable dependent variables in Table 3 (also incorporated in Figures 2 through 6). Analysts perceived the skills of diplomacy, assertiveness, speaking, sales, politics, and non-verbal communication more importantly than users. On the other hand, users viewed the skills of directing, programming, training, and organizational communication more importantly than analysts.

These differences suggest that systems analysts consider the ability to work with others more importantly than users perceive to be the case. Users seem to view technical areas more importantly and, in fact, may have greater expectations for technical performance. Similarly, analysts perceived the roles of change agent, diplomat, researcher, communicator, and salesperson more importantly than users, whereas the users placed more importance on the roles of programmer and service provider. This set of perceptual differences implies that the users in this study were not fully aware of the many roles of a systems analyst. Users perceived the non-salary incentives of making friends and getting along more importantly than analysts, suggesting that users may be projecting their values.

The Tukey-Kramer (TK) Test was utilized because it is conservative in the case of unbalanced designs (Stoline, 1981).

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### Role Variables

- Intermediary
- Facilitator
- Change Agent
- Programmer
- Detective
- Designer
- Developer
- Liaison
- TroubShooter
- Documentr
- Diplomat
- Researcher
- Communicator
- ServProvider
- Manager
- Salesperson
- Director
- Scheduler
- Consultant
- Trainer

![Figure 4](image-url)  
**Figure 4.** Means of Role Variables for Analysts and Users (Private and Public Sectors Combined)
to the function of systems analysis. Public sector participants place greater value on the skills of programming and analysis and design; they perceive as more important the roles of programmer, designer, developer, trouble shooter, and documenter. The differences by organizational type raises the question as to whether users and analysts in public organizations have the same qualifications and knowledge as those in private organizations.

**Discussion and Conclusions**

**Analyst/user perceptual differences**

Beliefs about what people do, how they do it, and what motivates them can lead to behavior expectations that could affect the relationship between users and systems analysts. Systems development activities inevitably place analysts and users in a conflict situation (Paddock, 1986; Robey and Farrow, 1982). Each group is constrained by organizational goals and requirements on the one hand and attempts to protect their own interest on the other (Robey and Markus, 1984). In some circumstances, users develop their own applications partly due to dissatisfaction with the efforts of systems analysts (Rivard and Huff, 1984). However, an understanding of differences in perception may be helpful in improving user/analyst interaction.

**Job Skills and Roles**

Differences between user and analyst perceptions of job skills and roles could be a source of potential conflict. Systems analysts value behavioral skills, such as diplomacy, politics, and sales more importantly, while users attribute greater importance to technical skills, such as
Systems Analysts' Skills, Roles, Incentives

programming. A likely explanation is that systems analysts believe they must rely on behavioral skills to effectively interact with the user during the crucial stages of problem definition and analysis, whereas a minimum level of technical skill, such as programming, is assumed by analysts to be a given but not necessarily the most important skill for application program development.

Management should recognize that successful systems development is dependent upon both behavioral and technical skills. Appropriate training sessions for analysts dealing with improving behavioral skills, especially interviewing and listening, should be provided. Similarly, management should have an orientation program for users, prior to engaging in new projects, about the specific activities of systems development and the associated skill requirements of analysts.

Such programs would facilitate an increased refinement of interaction skills and promote a greater user awareness of the importance of behavioral skills for the function of systems development.

As users become more literate in working with computers they may develop greater expectations for the display of technical wizardry by systems analysts when, in fact, users only observe systems analysts during the stages of project development requiring interaction skills. Because there have been many recent technological advances in systems development (e.g., prototyping, fourth generation languages, code generators, computer-aided systems engineering), users may be expecting a corresponding increase in technical sophistication of analysts; and yet the interaction of users and analysts in the development process remains virtually un-

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**Figure 6. Means of Incentive Variables for Private and Public Sectors (Analysts and Users Combined)**
changed. The result may be that users perceive the analysts to be lacking technical sophistication when analysts actually might be gaining more technical sophistication. Users also may perceive themselves to be in control of development projects and relegate systems analysts to the role of technical supporters and service providers. Therefore, it may be difficult for systems analysts as a group to achieve full recognition from users, who could be assessing the performance of systems analysts incorrectly, thereby creating conflict and generating frustration for analysts. Educational programs about the development process and analyst job function, targeted to prospective users, could help reduce conflict caused by these perceptual differences. In particular, users should be introduced to the various phases of systems development and the relative importance of different analyst roles and skills required for each phase.

Management should exercise a great deal of care in the administration and interpretation of user satisfaction instruments. Based on the results of this study, users may be biased in their expectations of analyst skills and roles. This bias could affect not only user evaluation of the performance of systems analysts but ultimately user satisfaction with systems. Those who claim that user involvement and user satisfaction are essential for systems success (see for example Ginzberg, 1981; Kaiser and Srinivasan, 1982; Robey, 1979) also should be concerned with the differences in skill and role perceptions. Certainly users should be involved, but their involvement should be based on being well-informed about both the process of systems development as well as the skills and roles necessary for analysts to successfully complete the process. Users should undertake a systems analyst role-

Figure 7. Interaction Effect of USERDP x SECTOR for Diplomacy
playing exercise to help reduce these perceptual differences.

Non-Salary Incentives

The results of this study show that analysts and users have similar beliefs about the importance of non-salary incentives for systems analysts. Promotion to the next highest level, recognition from others, and personal growth and development are perceived as very important non-salary incentives for systems analysts. However, research shows that systems analysts experience some dissatisfaction with their jobs (Woodruff, 1980). This dissatisfaction has been related to job turnover (Bartol, 1983) and high stress (Ivancevich, et al., 1983). User/analyst conflict and the job dissatisfaction of analysts in part may be attributed to not being able to achieve the non-salary rewards commensurate with performance. It could be argued that professionals engaged in service, such as systems analysts, have a need for recognition for their accomplishments from their constituencies. Some of the non-salary incentives for performance, such as recognition, may be difficult for analysts to achieve due to the potential disparity in expectations. Analysts who display skills and roles that are not perceived as important by users may not achieve a corresponding level of recognition by users, even though those same skills and roles may be instrumental in applications development. Professional development, achievement, recognition and other forms of incentives for growth of systems analysts should be based on performance. Project managers should ensure that analysts receive appropriate feedback on

![Figure 8. Interaction Effect of USERDP x SECTOR for Programming](image-url)
performance and that performance expectations are established by specific task requirements and not driven by user perceptual expectations.

Public/private sector differences

Analysts and users in the public sector believe technical skills (programming, analysis and design) are more important than do those in the private sector. Given that the stages of systems development are presumed to be generally the same (Green, et al., 1985; King, 1984), this relative difference in perceived importance of technical skills may be attributed to basic differences of users and analysts by sector, as may be inferred from the interaction effects for diplomacy and programming skills. Users and analysts in the public sector differ from users and analysts in the private sector by some demographic variables, such as age and education, that could contribute to perceptual differences. Are there also differences between those in public organizations and private organizations by qualifications, skills, and performance? These and other questions about sector differences need to be resolved.

There also could be a difference in user-generated requirements between public and private organizations. For example, private organizations could concentrate more on marketing applications than organizations in the public sector. Other factors, such as deadline requirements, budgets, database availability, technical support, and internal auditing standards, could account for differences between the sectors. Public sector participants perceive friendship and getting along with others more importantly than their private sector counterparts. The work environment for system analysts in public organizations may be perceived as offering a source of non-salary incentives somewhat different from the private sector.

Future research directions

Results of this study raise several important issues that merit continued research. Users typically only witness the skills and roles that involve interaction with analysts. Further research is necessary to determine the extent of perceptual differences for those skills and roles that do not involve interaction. This study, based on extensive pilot research, defines the components of systems analysts' behavioral skill requirements. Additional research is required to specify the exact conditions for which the definitions hold and are applicable.

The question of whether computer-literate users differ from others in their expectations of performance by analysts needs to be resolved. There is a dramatic difference between the knowledge required to use personal computers for spreadsheets and world processing versus the knowledge required to develop and implement a major application.

Further research on organizational context issues is recommended. Public and private employees display some differences in their perceptions. Specifically, why do public employees involved in systems development assign greater strength to technical skills than their private sector counterparts? Does the private sector have higher overall skills and better-trained individuals than the public sector due to higher pay? Do public organizations have more applications that are legislatively mandated with emphasis on explicit technical requirements?

In conclusion, further research is necessary to determine the content and context of the systems analyst job function, particularly with the potential for new technologies to change the task environment of traditional systems development.

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**About the Author**

Gary I. Green is chairman and associate professor in the Department of Computer Information Systems and Production Management, College of Business, Boise State University. His current research includes productivity assessment of systems development, utilization of decision support systems, and relationships between decision makers and support systems. His work has been published in several journals, including *Decision Sciences, Journal of Management Information Systems*, and *Computers and Operations Research.*