In commenting on the cross section of computer science research in South Africa, I will use the classification in the table of contents of the "Summary of Awards: Fiscal Year 1989," a document published recently by the US National Science Foundation. Of the 5 categories, I will treat Numeric and Symbolic Computation as inappropriate for the discussion below. In this category I noted no research in the computer science setting in South Africa. It is also common in the US and elsewhere to place this effort in other departments, e.g., departments of mathematics or applied mathematics.

Of the remaining categories I found South Africa to be strongest in software systems and engineering, to have a substantial investment in computer systems and architecture, and to be weakest in computer and computation theory.

The coverage in software systems and engineering (SSE) was broad, topical, and similar in scope to that in US universities. Technology transfer and the corresponding relations with industry seemed to be in place or developing along promising lines. I comment in passing that this was rather surprising to me. In the US the development of SSE within university departments has lagged behind almost all other disciplines of computer science. A primary problem has been the insatiable appetite of industry for all Ph.D. graduates in the SSE field.

The investment in parallel processing, computer networks, and distributed computing appears sound, although I expected to see a greater emphasis on mathematical foundations (see my remarks below), particularly in the parallel algorithms area. Given current resources, South African institutions are doing remarkably well in computer science research. But computer science is a fundamentally important course of study, beginning at an early age and extending through graduate Ph.D. research; I take this as sufficiently obvious that I need not dwell on justifications. With this in mind, and with the necessary resources in hand, South Africa should, in my opinion, expand and consolidate its computer science research effort, increase its visibility in the international arena, and correct the rather thin distribution of graduate research among universities.

I can see much of this proceeding along present lines, but I would strongly recommend a concerted development in computer and computation theory (CCT), education and research; this is mainstream computer science and forms the basis for virtually all other fields of study within computer science. It is by no means absent in South Africa curricula, but it appears to be under-represented in advanced studies and Ph.D. level research.

At the graduate level CCT is heavily mathematical. I understand that mathematical foundations are supplied by mathematics departments in certain cases. This is not ideal, but workable and it is justified by limited resources. However, it is important that mathematics departments not regard this as a mere service; faculty will have to make a major commitment to theoretical computer science, publishing in its leading journals (e.g. SIAM Journal of Computing, Journal of the ACM, Journal of Algorithms, Algorithmica, Journal of Computer and Systems Sciences, Theoretical Computer Science, etc.), and providing the supervision of theses sponsored by computer science departments and leading to degrees in computer science. I would also encourage active participation in the international computer science "theory" societies and their meetings; two highly prestigious examples of the latter are the annual Symposium on the Theory of Computing and the Foundations of Computer Science conference.

Returning to the thin distribution of computer science research, I would make the following point. If the current situation is only a stage of development - i.e., if further resources (both human and financial) can be counted on to bring at least a few of the departments to a critical mass - then little needs to be said beyond the earlier remarks. Critical mass is hard to define, but calls for adequate, expert coverage of mainstream computer science research. In view of the breadth of this research, 8-10 Ph.D. full-time-equivalent faculty would seem to be barely adequate; with the usual clumping of faculty in specific research areas, more would be expected. South Africa has a talent base such that there is little doubt that such departments would achieve a much wider international recognition.
On the other hand, if resources remain fixed at current or even slightly retrenched levels, then I would recommend consolidation to achieve the same goals on a smaller scale. Within a university this can often be done by establishing interdisciplinary, degree-granting laboratories or institutes of computer science, which bring together the computer science efforts located in various departments other than computer science, such as electrical engineering, industrial engineering, business/management science, mathematics, and operations research. The idea is to enjoy the advantages (opportunity, synergy, awareness, etc.) to both students and faculty of reasonably large computer science programs. There are many examples of such intramural laboratories in North America and Europe.

This approach could also be considered among universities within a confined geographical area, admittedly with greater difficulty perhaps. The Institute of Discrete Mathematics and Computer Science connecting Princeton University, Rutgers University, AT&T Bell Laboratories, and Bell Communications Research is a possible model. Examples in South Africa might consist of universities and research institutions on the Reef or those in the Western Cape (just to mention those with which I'm a little familiar).

As a final comment, I should note that my impressions have been based on limited information which may not give a representative picture. I am sure that my reactions will be appropriately discounted where I have been off target.

Editor's Notes

Prof John Schochot has graciously accepted to be SACJ's subeditor for papers relating to Information Systems. Authors wishing to submit papers in this general area should please contact him directly. I look forward working with John, and to a significant increase in IS contributions in future.

The hand of the new production editor, Riel Smit, will be clearly evident in this issue. Those papers not prepared in camera-ready format by the authors themselves were prepared by him in TEX. He will be announcing revised guidelines for camera-ready format in a future issue. If you use TEX or one of its variations, Riel would be happy to provide you with a styles document to SACJ format.

At last some Department of National Education committee has decided that SACJ should now be on the list of approved journals. This places it amongst the ranks of some 6800 other journals. These include not merely a number of ACM and IEEE Transactions but also such journals as Ostrich, Trivium, Crane Bag, Koers, Mosquito News, Police Chief, Connoisseur, Lion and the Unicorn, About the House and Ohio Agricultural Research and Development Center Department Series ESS. You will recall that in 1990 this same committee decided that, if judged on its own merits, SACJ did not deserve to be on the illustrious list. In the absence of other evidence, we must assume that the sole reason for its revised decision is that SACJ's predecessor, Questiones Informaticae, was there. (I have a secret suspicion that the committee liked that name.)

It is my understanding that for official purposes, all journals on this list are regarded as equally meritorious, and all of them are more meritorious than any conference proceedings. What does all of this mean?

The momentous implication of the committee's deliberations is that the State will not give your institution a single cent for anything that you publish in SACJ. Instead, the State and your institution will scrupulously keep a score of the annual number of publications that count - but actually don't - because someday they might! And to encourage your enthusiastic participation in this Alice in Wonderland exercise, your institution might actually give you some of the standard subsidy funding that the State should have provided according to its own formulae, but didn't.

You will not be allowed to use this money to buy yourself a car - not even a casual meal. You may only use it to finance activities that are provably directed towards producing more papers in approved journals. The great consolation, of course, is that you will not be required to pay income tax on this money. The only tax involved will be the VAT component when you spend it in an approved manner. As a good computer scientist who enjoys recursion, my vote would be that all such revenue collected by the State should be earmarked to be placed in the pay packets of committee members who decided that SACJ should be approved.

If you publish in these approved journals with sufficient regularity and enthusiasm you will almost deserve to be regarded as a researcher. What you additionally need to do, is to ensure that you befriend and impress at least three overseas referees. You then apply to the FRD for official recognition as a researcher, and if they are sufficiently impressed, they will give you more of the non-taxable kind of money that you need to spend on research to publish in approved journals.

Derrick Kourie
Editor
Evaluating The Motivating Environment for Information Systems Personnel in South Africa Compared to The United States (Part I)

J Daniel Couger* and D C Smith†

* Distinguished Professor, I.S. and Management Science, University of Colorado, Colorado Springs, USA
† Associate Professor, Information Systems, Department of Accounting, University of Cape Town, RSA

Abstract

The South African computer industry suffers from a shortage of skilled staff. Therefore, an important management issue is to maximise the productivity and motivation of Information Systems (IS) staff in their current and future jobs. A research project was conducted to identify individual growth needs and job attitudes of South African IS Professionals. These results were analysed and compared with known motivation norms in the United States. The Job Diagnostic Survey instrument was used on a sample of 2740 IS professionals. The results show that South Africans compare favourably with their American counterparts and have a high need for growth and achievement coupled with a job that satisfies their requirements. The only exception is the programmer whose job dimensions appear not to match individual needs. Possible ways to overcome this problem are discussed.

Keywords: Motivation, IS Personnel, career paths, productivity

Computing Review Categories: K.6.1, K.7.1

Received July 1991, Accepted January 1992

1 Introduction

Staff shortages and high turnover of Information Systems (IS) staff are worldwide problems. In countries where there is considerable growth in Information Technology, the above staffing issues can lead to increases in development backlogs. In the short-term, IS management need to identify methods to maximise performance by ensuring staff are fully motivated in their jobs and their careers.

This paper describes a research project which investigated the attitudes of IS staff to their growth needs and to their current jobs. The South African results were compared with known American norms from previous research. The results of the survey are being reported in two parts. In this paper the results for analysts and programmers will be analysed. In a later issue of the journal part 2 will include an analysis of the results for the remaining job types.

Prior research into the motivation of IS staff has been dominated since the mid-70's by Couger and Zawacki[5]. Their surveys indicate that IS staff have a higher Growth Need Strength than any other job category and they identify ways to improve motivation and productivity.

2 The Survey Methodology

The survey instrument utilized for the study was the JDS-DPII version of the Job Diagnostic Survey. The reliability and validity of the survey instrument was substantiated in 1978[5]. This instrument was utilized to derive a data base on more than 9,500 United States computer personnel and over 11,500 computer personnel in other countries.

The JDS is based on the job characteristics model theory of motivation developed by Turner and Lawrence[9] and expanded by Hackman and Lawler[6]. The essence of this motivation theory is that an individual's need for growth must be matched by the degree of richness of the job assigned to that individual, to ensure motivation and productivity. Individual growth need strength (GNS) is defined as the strength of the individual's need for challenge, for moving beyond his/her present level of knowledge and ability, for being stretched. The motivating potential of a job is determined by the degree of richness of five core job dimensions: skill variety, task identity, task significance, autonomy and feedback from the job. The job's MPS (motivating potential score) is computed from the survey responses on the core job dimensions.

When MPS is matched to individual growth need, motivation can be expected to improve. If an imbalance occurs, motivation is not reaching its potential. Figure 1 depicts the job characteristics model of motivation[7].

The United States norms resulting from previous JDS-DP studies are assumed to be a satisfactory match concerning GNS/MPS. The large U.S. data base and 10 years experience of observing applicability in the IS field substantiates the suitability of the U.S. norms. Prior studies using the JDS-DP in countries other than the U.S. include Israel and Singapore[1], Hong Kong[2], Finland[4], Australia[3], Thailand and Korea[8]. These studies showed that, despite the vast cultural differences among these countries, the characteristics of computer personnel were quite similar. In other words, computer personnel tend to be more like each other, regardless of their country of origin, than their own cultural counterparts.
Analysis of the survey results was facilitated by use of a tailor-made program to compute and analyze data. The SPSS package was also used, for analysis of demographics. Definitions of the variables analyzed in this paper are provided in Appendix A.

3 The South African Survey

In the latter part of 1990, under the auspices of the South Africa Computer Users Council (CUC), the Department of Accounting of the University of Cape Town conducted a survey of motivation levels among South African computer professionals. Some 2737 survey responses were received, of which 92 were unusable. However, in some job categories the responses were too few for statistical significance. The job categories where there were sufficient responses for statistical significance are as follows:

- Manager: 517
- Analyst: 335
- Programmer/Analyst: 465
- Application Programmer: 446
- System Programmer: 178
- Data Comm Specialist: 129
- Computer Operator: 219

Data were collected on 16 job variables, related to five motivation aspects: job components, satisfaction levels, need for growth/achievement, and goal participation/feedback.

The study was designed to answer two questions:

**Question One** – Are South Africa computer personnel similar in characteristics to their U.S. counterparts.

**Question Two** – Are there job categories where there is a need for motivation improvement, specifically where the job’s motivating potential does not meet the growth needs of the jobholder?

The sample consisted of 73% males and 27% females. The male percentage was highest at the manager level (91%) and lowest at the programmer level (54%). The highly technical jobs were dominated by males (above 85%). Nearly three-quarters of the sample did not have a formal tertiary qualification and there were only 39 Masters degrees and one PhD. These figures are lower than those in other countries surveyed. However, nearly half the sample had a diploma. The South African sample was generally younger than the USA with 45% under 31. Some 83% of the programmers were under 29. The experience levels of the sample were surprisingly higher than those found in the USA with 43% of the sample reporting more than 9 years computer experience. This higher percentage could be attributed to a large number going directly from high school into the South African IS industry.

Appendix B provides a summary of the demographics.

4 Analysis of Survey Results

The premise of the job characteristics model of motivation is that the key factor for motivation is the work itself. The studies in the countries mentioned above showed that the work itself was ranked as the most important factor for motivation, regardless of culture. The same result occurred in South Africa. Table 1 provides the results of the ranking of 11 motivation factors by programmers and analysts in South Africa and the United States. Of the 11 factors ranked, only two had a difference of more than one place, opportunity for advancement and job security. Opportunity for advancement was ranked in 4th place by South African analysts and programmers while it was ranked 2nd place by Americans. Job security was ranked in 9th place by Americans compared to 6th place for South Africans. The top five factors were the same for both countries.

The factors in the table are self explanatory except for achievement versus advancement. The opportunity for achievement refers to opportunity to progress within the job...
category presently held. The opportunity for advancement refers to moving up to higher job levels.

Table 3 shows that the top place ranking of the work itself was ranked in first place regardless of gender, job type and age. The table also shows that, with one exception, the top four factors were in common between the two countries. The exception was job security, which was ranked 3rd for analysts and programmers in the age category of 20–30.

Therefore, the results of this portion of the survey substantiate the use of the job characteristics model, where the assumption is that the work itself is the most important motivator.

GNS vs MPS

Table 2 provides the comparison of GNS and MPS for analysts and programmers. All responses are shown on a scale of 7. (All significant differences cited in the paper are at the significance level of probability equal to or less than .05). Examining the first job type, analysts, illustrates how the comparison for GNS/MPS is made. For GNS, the South African mean score of 6.35 is not significantly different from the U.S. norm of 6.00. For MPS, the South African mean score of 5.20 is not significantly different from the U.S. norm of 5.37. There may appear to be significant differences between the scores for GNS and MPS. GNS averages over 6 on the scale of 7 while MPS averages only slightly above 5. This difference results from the formula for computation for MPS, which has multiplicative elements. As mentioned earlier, the indication of a satisfactory match is based on 10 years of observation in specific companies within the United States.

For programmer/analysts (P/As) there is somewhat serious mis-match between MPS and GNS. South African P/As have growth need significantly higher than that of their American counterparts, 6.30 compared to 5.95. MPS is not significantly different however. South African P/As need a richer job environment than their American counterparts.

Table 6 provides a comparison of responses on the five core job dimensions that make up MPS. Table 4 provides that information.

Managers of programmers need to seek ways to enrich these two core dimensions. There is a satisfactory match on the other three core dimensions of task identity, task significance and feedback from the job. For analysts, there is not a significant difference between U.S. and S.A. responses on any of the five job dimensions. For P/As there is a significant difference on only one dimension, autonomy.

Goal Related Variables

Table 5 provides a comparison of responses on the goal related variables: goal clarity, goal setting participation, goal acceptance and feedback on goals. For goal clarity and goal acceptance, there were no significant differences in the South African and U.S. mean responses, for all three job categories. For goal setting participation, South Africa P/As and programmers responses were significantly higher than those of the U.S. The same result occurred for feedback on goal setting. The mean responses for analysts on these two variables were not significantly different.

Satisfaction Variables

Table 6 provides the survey responses on the satisfaction variables: satisfaction with supervision, satisfaction with pay and general satisfaction. For the latter two variables, responses in the three job types are not significantly different between the U.S. and South Africa. Supervisory satisfaction is rated significantly higher by South Africans in all three job categories. For analysts, the S.A. ratings average 5.04 compared to 4.65 for the U.S. For P/As, the mean rating for S.A. is 5.15 compared to 4.60 for the U.S. For application programmers, the S.A. mean rating is 5.35 compared to 4.60 for the U.S.
### Table 3: Ranking of the Top Four Motivation Factors by Demographics

<table>
<thead>
<tr>
<th>Motivation Factor</th>
<th>Gender Male</th>
<th>Gender Female</th>
<th>Job P/A</th>
<th>Job Manager</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age Over 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Work Itself</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pay &amp; Benefits</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Advancement</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Achievement</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

### Table 4: Comparative Responses for Five Core Job Dimensions

<table>
<thead>
<tr>
<th>Job Category</th>
<th>Skill Variety</th>
<th>Task Identity</th>
<th>Task Signif.</th>
<th>Autonomy from the Job</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.58</td>
<td>5.36</td>
<td>5.86</td>
<td>5.25</td>
<td>4.90</td>
</tr>
<tr>
<td>United States</td>
<td>5.55</td>
<td>5.35</td>
<td>5.75</td>
<td>5.30</td>
<td>5.20</td>
</tr>
<tr>
<td>Programmer/Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.24</td>
<td>5.25</td>
<td>5.72</td>
<td>5.16-</td>
<td>5.09</td>
</tr>
<tr>
<td>United States</td>
<td>5.45</td>
<td>5.30</td>
<td>5.70</td>
<td>5.50</td>
<td>5.15</td>
</tr>
<tr>
<td>Programmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>4.85-</td>
<td>4.80</td>
<td>5.51</td>
<td>4.74-</td>
<td>4.94</td>
</tr>
<tr>
<td>United States</td>
<td>5.25</td>
<td>5.00</td>
<td>5.45</td>
<td>5.15</td>
<td>5.10</td>
</tr>
</tbody>
</table>

(Significant differences indicated by plus+ or minus-, are all at the probability < -0.05 level)

### Table 5: Comparative Responses on Goal Related Variables

<table>
<thead>
<tr>
<th>Job Category</th>
<th>Goal Clarity</th>
<th>Goal Setting Participation</th>
<th>Feedback on Goals</th>
<th>Goal Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.28</td>
<td>4.79</td>
<td>4.23</td>
<td>5.79</td>
</tr>
<tr>
<td>United States</td>
<td>5.00</td>
<td>4.35</td>
<td>4.00</td>
<td>5.60</td>
</tr>
<tr>
<td>Programmer/Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.29</td>
<td>4.64</td>
<td>4.21</td>
<td>5.65</td>
</tr>
<tr>
<td>United States</td>
<td>5.00</td>
<td>4.10-</td>
<td>3.85-</td>
<td>5.76</td>
</tr>
<tr>
<td>Programmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.31</td>
<td>4.25</td>
<td>4.20</td>
<td>5.80</td>
</tr>
<tr>
<td>United States</td>
<td>5.00</td>
<td>3.80-</td>
<td>3.85-</td>
<td>5.86</td>
</tr>
</tbody>
</table>

(Significant differences indicated by plus+ or minus-, are all at the probability < -0.05 level)

### Table 6: Comparative Responses on Satisfaction Variables

<table>
<thead>
<tr>
<th>Job Category</th>
<th>General Satisfaction</th>
<th>Supervisory Satisfaction</th>
<th>Pay Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.33</td>
<td>5.04</td>
<td>4.73</td>
</tr>
<tr>
<td>United States</td>
<td>5.10</td>
<td>4.65-</td>
<td>4.60</td>
</tr>
<tr>
<td>Programmer/Analyst</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.28</td>
<td>5.15</td>
<td>4.48</td>
</tr>
<tr>
<td>United States</td>
<td>5.35</td>
<td>4.60-</td>
<td>4.50</td>
</tr>
<tr>
<td>Programmer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>5.25</td>
<td>5.35</td>
<td>4.30</td>
</tr>
<tr>
<td>United States</td>
<td>5.30</td>
<td>4.60-</td>
<td>4.40</td>
</tr>
</tbody>
</table>

(Significant differences indicated by plus+ or minus-, are all at the probability < -0.05 level)
Social Need Versus Growth Need Strength

Table 7 provides a survey result that has occurred in all countries where computer personnel were measured with the JDS-DP. The strength of the need for growth is very high. In the U.S., GNS of computer personnel is the highest of all 500 jobs measured with the JDS. The computer field attracts personnel who have a very high need for challenge, for being stretched.

Conversely, the social need strength of personnel in the computer field is the lowest of all 500 occupations measured by the JDS. South African computer personnel are no different from their U.S. counterparts in this respect, according to the survey results. The field attracts persons who work very well alone. This attribute can be detrimental. Computer personnel may not interact often enough with their clients to ensure that the applications being developed truly meet client needs.

Low SNS is a reason for the low rating on feedback from management. Although not shown on a table, the responses for both the U.S. and S.A. hover around the midpoint of the scale of seven (for both South Africa and the U.S.), indicating an opportunity for improvement. This is a universal problem, occurring in all other countries where computer personnel have been measured with the JDS. One cause is the low social need of people in this field. However, while people rarely change their need for social interaction, they can change their behaviour. U.S. companies have instituted training programs to help computer personnel learn techniques to communicate more effectively and to work more effectively in groups. When the personnel have the "need awareness," they work diligently to acquire these new skills. Apprising them of their low SNS, in an occupation where strong relationship with clients is essential, is usually sufficient to attain the need awareness for additional training.

The one factor constant in the computer field is change. South African managers have been effective in updating managerial practices and work assignments to keep the motivating environment stimulating for analysts and P/As. However, they need to enrich the jobs of application programmers to bring the job’s MPS to a level equivalent with the high growth need.

The perpetual changes in the computer field demand that the environment be continually reappraised. Hopefully, the identification in this report of the 16 variables most sensitive to motivation provides additional information to facilitate the maintenance of a satisfactory motivating environment.

5 Conclusions

A healthy motivation environment exists in the South African computing community, gauged by comparing responses to the U.S. environment. South Africans had equivalent or higher ratings than their American counterparts on all the goal related variables and the satisfaction variables.

The profession is populated by persons with a high need for growth and achievement. Fortunately, most perceive their jobs to be rich in the core job dimensions which are key to motivation.

In one job category, application programmer, there is a disparity between MPS and GNS. South Africa GNS is significantly higher than the U.S. norm while MPS is significantly lower than the U.S. norm. Skill variety and autonomy are the two core job dimensions which are perceived to be deficient. The autonomy problem is easier to correct than the skill variety problem. Autonomy was also rated significantly lower than the American norms for P/As. Knowing that P/As and programmers are seeking more autonomy in their work, management can seek ways to ensure autonomy occurs. Management can also work with programmers to provide more variety in their work and ensure that the skills they possess are being well utilized.

In only one area, feedback in general and feedback specific to goals, is there a need for special management attention. The responses hovered around the midpoint of the scale of seven (for both South Africa and the U.S.), indicating an opportunity for improvement. This is a universal problem, occurring in all other countries where computer personnel have been measured with the JDS. One cause is the low social need of people in this field. However, while people rarely change their need for social interaction, they can change their behaviour. U.S. companies have instituted training programs to help computer personnel learn techniques to communicate more effectively and to work more effectively in groups. When the personnel have the "need awareness," they work diligently to acquire these new skills. Apprising them of their low SNS, in an occupation where strong relationship with clients is essential, is usually sufficient to attain the need awareness for additional training.

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The perpetual changes in the computer field demand that the environment be continually reappraised. Hopefully, the identification in this report of the 16 variables most sensitive to motivation provides additional information to facilitate the maintenance of a satisfactory motivating environment.

References

A Definition of Survey Variables

1. Key Job Dimensions: Objective characteristics of the job itself.
   (a) Skill Variety: The degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the employee.
   (b) Task Identity: The degree to which the job requires the completion of a "whole" and identifiable piece of work – i.e., doing a job from beginning to end with a visible outcome.
   (c) Task Significance: The degree to which the job has a substantial impact on the lives or work of other people – whether in the immediate organization or in the external environment.
   (d) Autonomy: The degree to which the job provides substantial freedom, independence, and discretion to the employee in scheduling his/her work and in determining the procedures to be used in carrying it out.
   (e) Feedback from the Job Itself: The degree to which carrying out the work activities required by the job results in the employee obtaining information about the effectiveness of his or her performance.

2. Satisfaction Measures: The private, affective reactions or feelings an employee gets from working on his job.
   (a) General Satisfaction: An overall measure of the degree to which the employee is satisfied and happy in his or her work.
   (b) Specific Satisfaction: These scales tap several specific aspects of the employee’s job satisfaction:
      i. Pay satisfaction
      ii. Supervisory satisfaction
      iii. Satisfaction with co-workers

3. Social Need Strength: This is a measure of the degree to which the employee needs to interact with other employees.

4. Goal Clarity and Accomplishment: These scales measure the degree to which employees understand and accept organizational goals. Further, it taps into the employees' feelings about goal setting participation, goal difficulty, and feedback on goal accomplishment.
   (a) Goal Clarity. How clear and specific the goals are for the job or the person. The person has a clear sense of priorities on his/her goals.
   (b) Goal Difficulty. The extent that goals or work objectives require a great deal of effort to complete.
   (c) Goal Acceptance. The extent that the person is willing to accept organizational goals.
   (d) Goal Setting Participation. Their feeling of having involvement in the goal setting process – of having an impact.

5. Individual Growth Need Strength: This scale measures the individual’s need for personal accomplishment and for learning and developing beyond his/her present level of knowledge and skills.

6. Motivation Potential Score: A score reflecting the potential of a job for electing positive internal work motivation on the part of employees.

B Summary of Demographics

<table>
<thead>
<tr>
<th>Experience</th>
<th>South Africa</th>
<th>U.S.A</th>
</tr>
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<tbody>
<tr>
<td>Below 1 year</td>
<td>8</td>
<td>18</td>
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<tr>
<td>1-4 years</td>
<td>26</td>
<td>37</td>
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<tr>
<td>5-8 years</td>
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<td>22</td>
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<tr>
<td>9-12 years</td>
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<td>13</td>
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<tr>
<td>13-16 years</td>
<td>11</td>
<td>5</td>
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<tr>
<td>Over 16 years</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>Below 31</td>
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<td>41-50</td>
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<td>Over 50</td>
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<tr>
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</tr>
<tr>
<td>PhD</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Notes for Contributors

The prime purpose of the journal is to publish original research papers in the fields of Computer Science and Information Systems, as well as shorter technical research papers. However, non-refereed review and exploratory articles of interest to the journal’s readers will be considered for publication under sections marked as a Communications or Viewpoints. While English is the preferred language of the journal papers in Afrikaans will also be accepted.

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  - author’s initials and surname;
  - author’s affiliation and address;
  - an abstract of less than 200 words;
  - an appropriate keyword list;
  - a list of relevant Computing Review Categories.
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## Contents

### GUEST CONTRIBUTION

**Impressions of Computer Science Research in South Africa**  
E.G. Coffman, Jr. ........................................ 1

### RESEARCH ARTICLES

**An Implementation of the Linda Tuple Space under the Helios Operating System**  
PC Clayton, EP Wentworth, GC Wells & FK de-Heer-Menlah .................. 3

**Modelling the Algebra of Weakest Preconditions**  
C Brink and I Rewitzky .................................. 11

**The Design and Analysis of Distributed Virtual Memory Consistency Protocols in an Object Oriented OS**  
KJ McGregor and RH Cambell ............................... 21

**An Object Oriented Framework for Optimistic Parallel Simulation on Shared-Memory Computers**  
P Machanik .................................................. 27

**Analysing Routing Strategies in Sporadic Networks**  
SW Melville .................................................. 37

**Using Statecharts to Design and Specify a Direct-Manipulation User Interface**  
L Van Zijl & D Mitton ..................................... 44

**Extending Local Recovery Techniques for Distributed Databases**  
HL Viktor & MH Rennhackkamp ............................. 59

**Efficient Evaluation of Regular Path Programs**  
PT Wood ...................................................... 67

**Integrating Similarity-Based and Explanation-Based Learning**  
GD Oosthuizen & C Avenant ................................ 72

**Evaluating the Motivating Environment For IS Personnel in SA Compared to the USA. (Part I)**  
JD Cougar & DC Smith .................................... 79

### TECHNICAL NOTE

**An Implementation of the Parallel Conditional**  
U Jayasekera and NCK Philips .............................. 85

### COMMUNICATIONS AND REPORTS

**Book Review** ............................................ 87

**The CSP Notation and its Application to Parallel Processing**  
PG Clayton ................................................ 90