WHAT CAUSES STRESS IN INFORMATION SYSTEM PROFESSIONALS?

Job stress can lead to burnout and turnover, costing IT organizations countless dollars in replacement costs, and making methods for measuring and minimizing stress a business benefit.

S

tress among information system (IS) professionals is long recognized as a key factor affecting IS productivity and turnover and leading to substantial associated costs. It is estimated that, on average, IS employees work 50 hours per week; almost half work an average of six hours on Saturdays and Sundays; and about 70% have worked while sick [2]. It has also been recently proposed that high stress levels affect the productivity of IS employees. In a recent survey of 16,000 international technology professionals in 28 nations, the productivity of U.S. programmers was shown to be on average 7,700 lines of code, compared to 16,700 lines for non-U.S. programmers [1]. One reason cited for this difference is job stress from “putting in 70-hour work weeks to meet business pressures and deliver IT projects faster.” Some employees are opting to switch careers as a result of job stress. It is estimated the average replacement cost for an IS employee runs between $32,000 and $34,000. Stress and the turnover it can cause may thus be a costly problem for an organization.

It is becoming increasingly clear that steps must be taken to address the problem of high stress because of its effect on employee productivity and turnover. However, before such strategies can be articulated, it is essential to examine the key sources of stress for IS employees. This article reports the results of a series of studies we have conducted to understand primary stressors for IS employees. We conducted in-depth interviews and collected data using an open-ended questionnaire. This resulted in a list of 33 stressors cited as most common. We categorized the stressors based on their association with one of seven factors, described as follows:

- **Training.** Two stressors were associated with this factor, involving the need for appropriate training and skills development to complete tasks.
- **Deadlines.** Five stressors were associated with the pressures of meeting time dead-
lines and the need to complete projects within schedule.

- **Coworkers.** Five stressors were associated with this factor, involving the pressures of working with coworkers and elements of power struggles and conflicts that may result from working with others.

- **Performance evaluations.** Three stressors were associated with performance evaluations.

- **Job security.** Six stressors were associated with this factor, which involves concerns about job loss due to downsizing, mergers, or other factors.

- **Career development.** Four stressors were associated with the needs of IS employees to keep up with developments in the field and pressures that result from continuing skill development.

- **User demands.** Eight stressors were associated with pressures put on IS staff by users, such as dealing with the IS user interface.

The averages of each factor (see the table on the next page) show their relative intensity on a 1–7 scale, with 1 implying a nonstressor and 7 associated with high stress. As the table illustrates, the pressure to meet specific deadlines was rated as the single most important factor associated with stress, closely followed by user demands. In addition, all 33 items were combined into a single scale, referred to as the Stress measurement and determination inventory (SMDI). Its average value for the current sample is 4.3.

**Stress Variations**

In order to understand whether stress levels are equal across various organizational characteristics, we examined seven demographic variables:

- Number of employees in the IS group,
- Years worked in the IS field,
- Years employed at current job,
- Number of IS jobs held previously,
- Hierarchical level of the respondent,
- Age group of respondent, and
- Gender of respondent.

We split the sample in quartiles for three of the demographic variables: number of employees, years worked in IS, and age. For the remaining demographic variables, we split the sample into three equal groups. Next, we conducted an ANOVA followed by a Scheffe’s test (for pair-wise comparisons) to examine how stress levels (as indicated by the SMDI) differed from the intensity of individual stressor components. The results are shown in Figure 1.

Each demographic variable axis in Figure 1 is divided into seven equal segments, representing the seven stressors described previously. In general, we found that increases in the demographic variables resulted in higher SMDI scores. We also found SMDI scores to be higher in female employees. These higher scores appear to be mediated by stressors involving coworkers and adequacy of training. Female respondents who worked in organizations with more than 180 employees reported higher stress scores than those with fewer employees, for example. Respondents employed at their current jobs for more than 11 years had significantly higher stress scores in the area of job security than those employed for shorter periods. In general, as the number of years in their current employment and their number of years in IS increased, respondents became increasingly concerned about job security. With an increasing number of IS jobs held, the stress drivers were job security, evaluations, coworkers, and user demands. Upper-level employees were more likely to express job security concerns than employees working at lower hierarchical levels. Increasing age was also associated with stress over job security, as well as career development stress.

Connecting the stress drivers for the demographic variable axes resulted in the shaded areas of Figure 1 that we call the organizational stress band, which illustrates the regions where stressors are reported to be high and significantly different within different
segments of each demographic variable. It shows that higher values of each demographic variable are associated with higher SMDI scores, and specific components of the SMDI vary across different levels of the demographic variable. Finally, this analysis demonstrates that respondents with the following characteristics report higher stress levels: those working in organizations with a large number of employees (>180), those employed at the organization for more than 11 years, those who have held more than 15 jobs previously, those at upper levels of the organizational hierarchy, and those who are more than 40 years old and female. The stress band also shows the differentiating characteristics of stress components.

We also discovered an interesting trend in the reported career development stress scores within the demographic variable of number of employees. We found stress levels to be higher at the low and high levels of the variable than at the intermediate levels. This is also shown in Figure 2 and is called the stress dip. We found similar trend lines in other demographic variables: number of years with the organization, number of IS jobs held previously, number of years in IS, and age.

**Stress and Burnout**

We investigated whether the stressors identified in this study were related to negative organizational consequences such as burnout, job satisfaction, and intention-to-quit. We measured burnout by using the emotional exhaustion subscale of the Maslach Burnout Inventory (MBI) [3]. We also collected data to measure job satisfaction and an individual’s intention to quit his or her job.

The correlation coefficients for these variables are shown in the table here. We had expected a high negative correlation between the SMDI (and its components) and burnout, job satisfaction, and intention-to-quit. All of the coefficients were as expected with the exception of those between satisfaction and user demands and between deadlines and intention-to-quit.

### Preventive Strategies

We designed the studies reported here with two fundamental objectives: to develop an instrument that can assist in the examination of stressors for IS employees; and through the development of this instrument, provide directions for appropriate intervention strategies [5].

In this regard, the cross-sectional data used in this study may be used to develop tentative standards. Percentile scores for the SMDI and its factors are shown in the table. These

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>Correlation Coefficients</th>
<th>Percentile Scores for SMDI</th>
<th>SMDI Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMDI</td>
<td>4.3</td>
<td>0.37*</td>
<td>-0.22*</td>
<td>0.20*</td>
</tr>
<tr>
<td>Training</td>
<td>4.2</td>
<td>0.21*</td>
<td>-0.13*</td>
<td>0.19*</td>
</tr>
<tr>
<td>Deadlines</td>
<td>4.8</td>
<td>0.36*</td>
<td>-0.14*</td>
<td>0.07*</td>
</tr>
<tr>
<td>Coworkers</td>
<td>4.0</td>
<td>0.22*</td>
<td>-0.14*</td>
<td>0.13*</td>
</tr>
<tr>
<td>Work Evaluation</td>
<td>4.3</td>
<td>0.16*</td>
<td>-0.15*</td>
<td>0.13*</td>
</tr>
<tr>
<td>Job Security</td>
<td>2.8</td>
<td>0.14*</td>
<td>-0.23*</td>
<td>0.17*</td>
</tr>
<tr>
<td>Career Development</td>
<td>4.3</td>
<td>0.25*</td>
<td>-0.27*</td>
<td>0.17*</td>
</tr>
<tr>
<td>User Demands</td>
<td>4.6</td>
<td>0.32*</td>
<td>-0.05*</td>
<td>0.13*</td>
</tr>
</tbody>
</table>

*Coefficients above 0.12 are significant at 0.05.*

Means, correlation coefficients, and percentile scores for the stressors.
statistics may be used in a more precise evaluation of stress measurement. The data reported in the table represents pooled results from all studies.

While the measurement and determination of stress factors is the first step, the incorporation of results into active intervention plans is the necessary second phase of any stress management strategy. Both the stress band and the stress dip can be integrated into an organizational intervention strategy that includes both prevention and management tactics (see Figure 3).

Recalling the message of the stress band—that higher levels of variables such as age, tenure, and size of the organization are associated with higher stress in areas such as employment security, performance evaluation, and career development—preventive strategies may include developing clear growth paths within the IT field, establishing open evaluation systems, and committing to continuous stress audits within the organization. Planning ahead for employee transfer in case of outsourcing or mergers may be useful in addressing the core stressor of job security. Helpful approaches may include sessions with employees to explain the possibility of organizational changes, avoiding surprise news, and the providing a clear schedule of forthcoming changes.

The stress dip indicates that stress levels are high when variables such as age, tenure, and size of the organization are at their lowest. For example, new employees generally exhibit higher stress levels. Preventive tactics may include the use of formal socialization programs to allow new employees to learn the “rules of the game.” The primary stressors for new employees involve concerns about performance and career development. Building a suitable socialization program where clearly defined opportunities for advancement are explained can be useful. Clear communications about performance and reward expectations were noted by many of our respondents as useful in reducing stress levels.

In addition, creating formal retention strategies built around training can address both the stress band and stress dip. Higher stress levels in older employees are not a new phenomenon in the IT world. Scalet [6] reports that only about 6.8% of the IT workforce in the U.S. is over the age of 55, compared to 11.7% of the general work force, and associations such as the Information Technology Association of America (ITAA) have received numerous reports of age discrimination. One reason for this is that the search for newer technical skills makes hiring younger employees more attractive. However, a formal and intensive retraining program may be used to leverage the business experience of older employees and reduce their stress levels. Finally, psychological intervention and counseling can assist employees who have been diagnosed with high stress levels.

Conclusion
There can be no doubt of the need to adequately measure, determine the causes of, and manage the stress syndrome. Falling somewhere between a measurement and a diagnostic instrument, the SMDI can prove useful in isolating some of the stressors that may negatively affect IS employees.

References

Vikram Sethi (vsethi@world.std.com) is chair and professor in the Department of Information Systems and Operations Management, Wright State University, Dayton, OH.
Ruth C. King (ruthking@uiuc.edu) is an assistant professor of information systems in the College of Business, University of Illinois at Urbana-Champaign, IL.
James Campbell Quick (jquick@uta.edu) is the director of the doctoral program in business administration at the University of Texas at Arlington.

© 2004 ACM 0002-0782/04/0300 $5.00