ABSTRACT
There has been a recent call in the Australian marketplace for information systems (IS) professionals to possess work skills that span many disciplines. A recent report (Deloitte et al, 1999) bemoaned a lack of business skills in IS professionals. Skyme and Earl (1990) mapped out the characteristics of the business worker and saw technical, business, organisational and personal skills as being important. Organisations are devolving in span of operations and downsizing in personnel levels. Technology is constantly changing and information systems professionals are being asked to cope with the need to develop differing skill sets. Against this scenario we sought the views of information systems professionals employed in SAP enterprises in the Australian and New Zealand marketplace about the training, career progression and skills mix that affected them. The main results of this survey showed that the ERP/SAP professionals occupy stable long-term positions but are looking to move into another organisation in just over one year. They favour a move into MySap.com or B2B fields and all have undergone extensive and effective SAP training. They are split when considering important factors in career progression citing training, technical skills and business skills as important.

ERP PEOPLE FACTORS

ERPs are a major issue facing businesses. The implementation of software is often complex and has a major impact on the business (Trunick, 1999). The complexity of ERP software implementation has resulted in projects becoming longer and more expensive and often not delivering the expected benefits (Bell 2000; Cameron et al, 1998). Trepper (1999) proposed that if a project team did not possess the required business, interpersonal and technical skills then the chances of project implementation success are negligible. Maxwell (1999) believed that part of the blame can be attributed to the complexity of SAP, but much of the blame lies squarely with change management and the confusion, resistance and redundancies that can be created. Added to this, is the problem that consulting firms can ignore the internal politics surrounding a SAP implementation. Few businesses are flexible enough to change their processes to suit to business models and achieve the implementation on time (Lucas, 2000; Davenport, 1998). ERP projects are particularly challenging and require careful planning of time and budget to avoid project disaster. This has resulted in businesses adopting alternative implementation methods (Ross, 1998). The purchase (Davenport, 1998) and implementation of an ERP application is just the beginning of a large investment in IT, and the projects are often different to other kinds of projects that the business have implemented.

Information Skill Sets

In 2000 the U.S. Departments of Commerce, Labour and Education released the 21st Century Skills (Stuart, 1999) report which described a vision of the specific competencies that will be required by 21st century workers. These included the ability to understand complex systems including social, organisational and technological systems. Inherent in this report is the skills of the personnel that handle information within organisations. Broadbent et al (1992) and Opie (1994) found that the numbers of users actually utilising data and information are increasing, and proposed that the skills required by information managers included networking and project management on the technical side, and business redesign and quality management on the business side. The 21st Century Skills report (Stuart, 1999) identified basic, technical, organisational and company specific skills as being crucial for workers into the 21st Century. A report released a decade earlier (Scan, 1992) saw four organisational competencies as being crucial:

- monitoring organisational performance,
- correcting organisational performance,
- designing new organisational systems,
- Improving organisational systems.

The Scan report also classified eleven organisational information skills that can be grouped into business and technical sub-groupings (Scan, 1992). The complete list of organisational skills:

**Business Information Skills**

- a) Understand the strategic nature of information.
- b) Have the ability to act as a change agent within the organisation.
- c) Take part in formal planning within the organisation.
- d) Be actively involved with quality assurance programs within the organisation.
- e) Be aware of changing organisational information processes.
- f) Have knowledge of the importance of informal information flows in the organisation.

**Technical Information Skills**

- g) Be conversant with emerging organisational information systems.
- h) Act as a liaison between information source and information user in the organisation.
i) Understand the need for greater integration of information across the organisation.

j) Be aware of the need for information flows across organisation boundaries.

k) Be actively involved with information users from diverse areas of the organisation.

We propose a skills matrix based upon technical, business and the interpersonal skills that modern IS professionals require as a pathway to become the “Hybrid” IS professional. A mapping of the eleven organisation information skills onto the skills matrix is presented in Figure 1.

Figure 1. Matrix of IS Skill Mix with Scan skill sets for the Hybrid IS professional.

E Business Careers

In the age of E-business will a new set of careers structures emerge? A crucial question for enterprises will be the management of their staff and their ability to keep “on deck” capable and motivated staff. The traditional ERP with an emphasis on transactional computing and back office systems has been well served by the information systems industry. The move to E Business will require all enterprises to manage the broader information chain within the E-business supply chain (Chung, 2000; Somers, 2000). Enterprises will need to decide if their workforce and or consultants will be able to take the next step into the E world. Training and education in technical, change-management, BPR and inter/intra department communication skills will be crucial for the success of large E-business projects. Just as a viable skills base is important for the organisation to succeed so to for the information systems professional. The IS professional may ask several questions; to follow consultancy versus full-time employment, to pursue degree versus certification education, undertake continuous versus IT training? Training as an implementation issue is undergoing stress both from the rapidly developing content being delivered as well as advances in delivery technology.

ERP A People Problem

There is very little documentation in reference to the training regimes, skills required and career planning within the implementation of ERP systems. The availability of historical data concerning ERP people factors could alleviate the problems of similar implementations in the future. This lack of historical data is even more critical when applied to Australian experiences. Even though there has been many ERP implementations in Australia very little data is available. The collection of such information could assist in project management of ERP system implementations and accordingly prevent some of the documented pitfalls that have plagued previous projects.

METHODOLOGY

The primary objective of the study was to survey a range of ERP information systems professionals and seek responses to issues including training regimes and career progression. SAP Australia was chosen as the study vector as it dominates (IDC, 1999) the ERP market in Australia. The first part of the study as presented in this paper will provide an analysis of SAP professionals including: career progression, training history & analysis and E-business career opportunities.

Research Methodology

The best method for gathering data was determined to be a survey of those information systems professionals listed as working within the ERP marketplace. SAP Australia provided two customer data files. The first was the customer file, this contained client name, contact, implementation date and type. The second file contained name, go-live date and module information. The two files were combined into a database and cross-referenced with a Bloomberg datastore to include financial data pertinent to the enterprises. This datastore provided contact details of about 500 information systems professionals that have worked on SAP systems from 1995. The initial survey instrument was developed based on the fields that were identified in the literature and used email as the delivery platform. Several studies (Dillman, 1998; Comley, 1996; Mehta, 1995) have compared email versus mail information collection methods and have that email surveys compared favourably with postal methods in the areas of cost, speed, quality and response rate. The use of an email directing the recipient to a web site was also investigated but was thought to introduce an additional step in the sampling process. The survey form was piloted with a small (N=25) sample from SAP organisations. After minor refinements suggested by the pilot tests the final survey email was sent to the cohort with one follow-up reminder. It was necessary to preen the email address book to remove and amend email that had bounced back.

RESULTS

Survey Instrument

The survey instrument had 14 questions covering three areas, SAP issues, training history and career progression. Both open and closed questions were used along with Yes/No and five point Likert scale responses. Any response was cross-referenced with the original SAP master listing allowing organisational type data to be incorporated. SAP issues included time working on SAP, version and the extent by which ERP/SAP had helped career achievement. Training issues included number and type of training courses as well as Likert rating of effectiveness of course. Career issues included current and self-assessed future job longevity as well as potential career changes.

Responses

The original email listing contained 455 potential respondents from 387 Australian and New Zealand organisations. It contained multiple email addresses from an organisation and was a historical listing containing information up to 4 years old. A number of emails were undeliverable due to members of the cohort moving positions, having incorrect email addresses, having changed email addresses or automatic out-of-office responses. The overall response rate once removing the undeliverable addresses was 31%. The response rate is presented in Table 1.
Responses were received from 108 SAP professionals and the data were analysed to present position, company type, company size and SAP version. Responses for the whole cohort are presented along with cross-tabulations based upon respondent position. The results are presented in Table 2.

Table 2. Demographic Breakdown of respondents (N=108)

<table>
<thead>
<tr>
<th>Position</th>
<th>% Org type</th>
<th>% All</th>
<th>% Org size</th>
<th>% Vers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Managers</td>
<td>26</td>
<td>Public Admin</td>
<td>45</td>
<td>Large</td>
<td>83</td>
</tr>
<tr>
<td>IS Consultants</td>
<td>11</td>
<td>Retail/Wholesale</td>
<td>14</td>
<td>Large</td>
<td>11</td>
</tr>
<tr>
<td>Business Managers</td>
<td>18</td>
<td>Mining</td>
<td>11</td>
<td>Medium</td>
<td>5</td>
</tr>
<tr>
<td>SAP Basis</td>
<td>14</td>
<td>Utility</td>
<td>4</td>
<td>Small</td>
<td>5</td>
</tr>
<tr>
<td>SAP Admin</td>
<td>11</td>
<td>Finance</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>SAP Support/Tech</td>
<td>21</td>
<td>Manufacturing</td>
<td>13</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>IS Focused</td>
<td>83</td>
<td>Transport</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Non IS Focused</td>
<td>17</td>
<td>Control Service</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

All IS based professionals had undertaken SAP training with SAP administrators undertaking the highest number of courses. The low standard deviation for SAP administrators shows a good agreement. Business managers had completed an average of 2 courses. Offline SAP training was very popular with all respondents with an overall good rating. ASAP and Delta training modes had been completed by only about 12% of the cohort with low rating of effectiveness. SAP consultants and SAP support professionals report high satisfaction with the SAP classroom training.

Table 5. SAP Training Modes by Position (N=108)

Career Progression

Respondents indicated the length of their current job as well as their proposed stay in their current job by selecting a value from 1 to 5, with one representing <6mths, two 6-12mths, three 12-18mths, four 18-24mths and five >24mths. Table 6 shows the percent desiring ERP related career moves and mean of current and proposed job longevity. Respondents indicated in an open question other career moves not relating to ERP fields and these include e-commerce, business analysts, web analysts and java developers. Table 6 shows the mean and standard deviation for positions of cohorts.

Table 6. SAP Job Stay and Career Moves by Position (N=108)

Consultants and SAP support professionals plan to stay about two years in their current positions with all other professionals planning a fourteen months stay. IS Managers reported heavy interest in the MySap.com and B2B fields with consultants interested in MySap.com fields.
Several trends are evident in general career movements. Moves to different organisations over current organisations are popular with the entire cohort. IS managers and SAP Basis favoured moving to a similar position in a different organisation. This indicated a degree of flexibility in their transferable job skills. SAP Basis professionals are looking at moving overseas either in a similar or different position. SAP administrators do not favour a move to different positions in the same, different or overseas organisations. This may indicate that these professionals are not looking to move or are unable to transfer into related job areas.

DISCUSSION

Career Progression

The cohort was essentially a stable body of professionals who saw a change in position taking place in about one year. That new position was going to be in the same field but probably in a different organisation. If new fields were being considered it probably would be MySap.com or a B2B position. SAP had been a boon for the cohort with high levels of agreement that SAP had been a great help. IS managers and SAP specialists (Basis, Support & Administrators) all reported high levels of agreement that SAP had been a boon but were all looking at changing position sooner rather than later. This trend should be studied in light of the reported (Deloitte et al, 1999) shortage of 31,000 IT workers in 2000 growing to 180,000 in the year 2004 in the Australian marketplace.

Open-ended questions showed that E-business career moves were being considered. Some of the proposed fields included e-commerce, business analysts, web analysts and java developers.

Training Options

Moves by SAP with their Virtual Classroom highlight the use of the WEB for content delivery in training. The entire cohort had undertaken training in SAP related topics. Offsite SAP classroom training was very popular whilst CBT options including ASAP and Delta were not extensively used. Open-ended questions showed that respondents felt that books, manuals, on-line help and the use of consultants all proved viable training options. The acceptance of instructor centric training will prove a challenge for designers of Web or virtual training modes. Another issue is the acceptance of organisations to adopt training to “skill up” the workforce. The recent IT&T report (Deloitte, 1999) predicted that Australian will rely upon recruitment or poaching of skilled professional rather than developing in-house trained professional. The report indicates that this will lead to increased “churning” and an escalation of the price of IS professionals. Reports from the US (Stuart, 1999) and the European Commission (European Council, 1998) all point to the need to improve and expedite training of IS professionals to pave the way into the emerging E-Business marketplace.

REFERENCES

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