INTRA-ORGANISATIONAL ERP LIFECYCLE KNOWLEDGE ISSUES

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Abstract: A study of 27 ERP systems in the Queensland Government revealed 41 issues clustered into seven major issue categories. Two of these categories described intra- and inter-organisational knowledge-related issues. This paper describes and discusses the intra-organisational knowledge issues arising from this research. These intra-organisational issues include insufficient knowledge in the user base, ineffective staff and knowledge retention strategies, inadequate training method and management, inadequate helpdesk knowledge resources, and finally, under-resourced helpdesk. When barriers arise in knowledge flows from sources such as implementation partner staff, training materials, trainers, and help desk staff, issues such as those reported in this paper arise in the ERP lifecycle.

1 INTRODUCTION

This paper reports results from a Delphi Study of major issues that arose during the deployment and ongoing management of 27 Enterprise Resource Planning (ERP) systems within the Queensland Government, a state government of Australia.

In 1994, the Queensland Government selected SAP R/3 to replace the existing, centrally managed, mainframe-based, Dun & Bradstreet systems. Each SAP implementation was managed separately, employing different implementation partners (IPs), the majority drawn from large consulting firms e.g. Accenture. During the course of these implementations, numerous issues arose, several of them knowledge-related.

Although increasingly widespread, and despite warnings in the literature (Boston Consulting Group, 2000), many organisations appear to underestimate the issues and problems often encountered throughout the ERP lifecycle. ERP lifecycle-wide implementation, management, and support are ongoing concerns. As the number of organisations implementing ERP increases and ERP applications within organisations proliferate (Bancroft et al., 1998; Davenport, 1996; Hiquet et al., 1998; Shtub, 1999), improved understanding of ERP lifecycle management issues is required so that implementation, development, management, and

training resources can be allocated effectively (Gable, 1998).

This paper concentrates on five intra-organisational, knowledge-related, ERP lifecycle issues. These five issues were initially identified during the first round of a Three-round Delphi process. A factor analysis of weights ascribed to issues in the third Delphi round resulted in five issues clustering within a single factor: *Knowledge required to support and run SAP was not managed effectively*.

This study is unique because it built the list of issues using inductive, data driven and holistic / interpretive approaches. To date, there has been a paucity of literature addressing knowledge-related ERP lifecycle issues.

This paper will firstly describe the Delphi method by which the issues were uncovered and the factor analysis that grouped these five issues together.

Each of the five knowledge-related issues will then be discussed individually. Finally, this paper will summarise the knowledge-related findings from this research programme.

2 DELPHI METHOD

The Delphi method, developed by the Rand Corporation in the 1950s, is a data collection

approach designed to structure group opinion and discussion (Snyder-Halpern et al., 2000).

Mohapatra et al. (1984, p. 159) suggest that a Delphi study is usually directed to four broad categories of issues. These are: normative issues such as goal setting; narrative issues such as problem statements; predictive issues such as forecasting occurrence of new events or point values and trends of key parameters; and, suggestive issues such as developing causal models and formulating new policies. The category that this study falls into is the 'narrative issues such as problem statements'.

This Delphi-study consisted of three rounds. Round-One sought to inventory issues. The central question posed to the target respondents was *"What do you consider have been the major issues in implementing, managing and/or supporting the Enterprise System in [agency name]?"* 432 surveys were sent out and 130 were returned of which 112 from 15 clients and five implementation partner (IP) organisations were usable. Respondents were also classified as being either Strategic or Operational staff. 708 raw issues were harvested from this process. We next synthesised their responses into a manageable, summary set of issues (initially 41) using an open-coding approach.

In Round-Two, we validated our summary set of issues. Each response from Round-One was mapped to the summary set of issues and returned to each respondent for confirmation of that mapping. Following this confirmation round, the research team held a workshop of senior ERP experts from Queensland Government. Using Nominal Group Technique, these experts refined the final set of (37) summary issues. In Round-Three, respondents were asked to score or weight the relative importance of the summary issues using a Likert scale. We elicited 207 usable responses from the population for Round-Three. Factor analysis was conducted to identify the major issue categories.

The Delphi Method was deemed the appropriate method to use because this was an empirical, exploratory study to systematically identify, rationalise and determine the relative importance of ERP lifecycle issues.

The next section reports the list of major issues categories resulting from the factor analysis. The (equal) second issue, which describe the internally focused knowledge issues, is discussed in this paper.

3 FINDINGS

Table 1 lists the major issues arising from a factor analysis of weights attributed to the 37 issues found in the Delphi study.

Table 1: Resultant factors.

Major issue Category	Rank	Mean	Std Dev
Lack of organisation-wide knowledge strategy reduces benefits	1	4.92	1.87
Knowledge required to support and run SAP was not managed effectively	=2	4.30	2.02
Costs are too high or benefits relative to costs are too low	=2	4.30	2.16
Customisation and systems integration	4	4.18	2.03
The SAP system is inadequate or difficult to use	5	4.17	2.05
Poor management of the implementation project and processes	6	4.17	2.11
Organisational restructuring affected implementation effort	7	3.57	2.14

There are seven factors listed in Table 1 of which the first two are knowledge-related. The first factor *"Lack of organisation-wide knowledge strategy reduces benefits"* refers to inter-organisational knowledge issues. These issues are not discussed in this paper. The second major issue category, *"Knowledge required to support and run SAP was not managed effectively"*, encompassing intra-organisation knowledge issues, is further explored.

The five issues that clustered into this second major issue category are: (1) Users do not have sufficient SAP knowledge; (2) Staff/knowledge retention strategies were ineffective; (3) The training method or management was inadequate; (4) Help desk SAP knowledge was inadequate; and, (5) The help desk was under-resourced.

This major issue category predominantly concerns knowledge management issues that are internal to an organisation. The overall research argues that ERP knowledge management decisions/strategies taken early during the systems lifecycle affect knowledge related decisions at later points in the lifecycle e.g. if you outsource implementation management to consultants without properly constructed knowledge transfer mechanisms in place, problems can occur in support and upgrade phases (Timbrell et al., 2003).

Poorly targeted or inadequate training will lead to a diminished staff knowledge base putting further pressure on support and help desk staff.

The help desk is a central source of ERP knowledge in an organisation. Because it is often the last internal knowledge resource before seeking (often expensive) outside assistance, insufficient help desk knowledge can result in diminished ERP performance and (possibly) reduced organisational effectiveness.

Even if an organisation has developed sufficient ERP expertise within its staff and help desk during an implementation, part of an enterprise knowledge strategy must address retaining that expertise. Under certain market conditions specific knowledge can become scarce, thereby forcing up its price. This major issue category includes issues that result from a paucity of internal knowledge resources.

The following sections will discuss each of the five issues in detail. The format of the discussion will be as follows: firstly, a description of the issue from the Round-Three survey is provided; secondly, there is an example of a (Round-One) response from which the issue category is derived; thirdly, there is an example comment from a respondent from the Round; this is followed by general discussion on the issue; finally, some comments are made about the different perspectives of responding cohorts – Operational vs. Strategic Staff and Client vs. IP.

3.1 Users do not have Sufficient SAP Knowledge

The respondents who rated this issue perceived that "*For a variety of reasons users do not have sufficient knowledge about the SAP system to run, maintain or configure it properly*".

An example of a Round-One issue reported by a [Client-Strategic] respondent in this category is: "*System Knowledge - Not full knowledge of system and its requirements and some were critical for usage.*"

A comment made in Round-Three by a [Client-Operational] respondent in the same department noted: "*General users – as with any system, some users excel and some have ongoing difficulties, while the majority learn enough to perform their duties. User knowledge limited by the amount of initiative or desire to understand the system.*"

3.1.1 Discussion

This issue addresses users' lack of knowledge of the SAP system. The identification by respondents of a

lack of knowledge about the SAP applications within the user community implies that greater knowledge would enable the system to function better and, subsequently, there would be greater resultant benefits to the organisation. A Round-One respondent noted that users were unaware of some necessary critical functions in SAP that required ongoing oversight. This is an example of 'unconscious incompetence' where a novice does not realise they are making errors through lack of knowledge (Howell, 1982).

This issue is the third highest ranked issue in the study. Comments from Round-Three vary in their reasons for the lack of SAP user knowledge. One respondent blames the users themselves for not exploring the software of their own accord. Another suggests that the training was inadequate and yet another blames this outcome on the reliance and role of the IPs. This is an example of 'finger pointing': one group blaming another for weaknesses, issues or the non-realisation of benefits.

Operational vs. Strategic: Operational staff ranked this issue as the second most important issue overall with Strategic staff ranking it seventh. The two cohorts generally agree on the importance of this issue.

Client vs. IP: While Client staff ranked this issue second, IP staff ranked it nineteenth. The mean of Accenture's and PWC's rating was the same at 4.0, below that of all the major agencies. The difference in perception of this issue's importance between Client and IP could be illustrated by the IP's comment in the Round-Three survey (above) where they note that the users' knowledge is increasing over time. In other words they could be suggesting that this lack of knowledge will correct itself and therefore is not an ongoing concern.

3.2 Staff/Knowledge Retention Strategies were Ineffective

The respondents who rated this issue perceived that "Staff (and their knowledge of SAP) were lost to other organisations. The incentives and strategies to retain them were inadequate" (Round-Three Survey Instrument).

An example of a Round-One issue pertaining to "Staff (and their knowledge of SAP) were lost to other organisations" reported by a [Client-Operational] respondent in this category is: *Knowledge drain - Implementation partners overly responsible for configuration. Departure of implementation partner meant departure of specialist knowledge insufficient skill sharing*. In

relation to: "The incentives and strategies to retain them were inadequate", a [Client-Strategic] respondent reported: *Retaining skilled staff whenever in house staff are trained to a high level of proficiency, the market place beckons as the salaries paid in the commercial are higher than those on offer in the public sector.*

3.2.1 Discussion

The world-wide market for SAP R/3 was booming in the mid to late 1990s and demand for staff was very high. Vayo, a Queensland Government senior ERP manager, reported that once they went 'live', most Queensland Government departments immediately lost their skilled staff.

Skilled and experienced SAP staff working in the government could sometimes double their salaries by moving into implementation partners or just contracting to implementing organisations.

By 2000, most departmental implementations had finished. The end of the implementations led to a subsequent drop off in demand for SAP expertise. Scores of consultants were made redundant and the salary levels collapsed. SAP support staff were now in plentiful supply but this development did not necessarily solve the knowledge retention issue.

Following the Year 2000 'event', agencies began implementing the first round of SAP upgrades. In come cases (e.g. Premiers), the extent and cost of these major upgrades matched or exceeded the initial implementation and management began to appreciate the need to recall their lessons and practices from these initial projects.

3.3 The Training Method or Management was Inadequate

The respondents who rated this issue perceived that "The quality and/or quantity of training was unsatisfactory and did not prepare users and/or help desk personnel adequately. Trainers did not have sufficient experience in the software. The training strategy was poorly executed. Training has not been ongoing" (Round-Three Survey Instrument).

An example of a Round-One issue reported by a [Client-Strategic] respondent in this category is: *Inadequate training of Implementation Team: Agency resources should be given adequate pre-implementation training and background knowledge in the capability of SAP.*

A comment made in Round-Three by a [IP-Operational] respondent observed: *Often to cut costs, training is provided on a train the trainer*

basis. The newly trained trainer may not follow through properly.

3.3.1 Discussion

Training and updating employees in ERP knowledge is a major challenge. ERP are complex and employees not only have to absorb the technical knowledge but also their new process responsibilities (Bingi et al., 1999). Sumner (2000) identified 'insufficient training and re-skilling of the IT workforce in new technology' as a risk factor in the systems implementation and maintenance phases of an ERP system project. Markus et al. (2000) noted common ERP training related problems such as poor quality of training materials and cutting training when the schedule gets tight. Both Bancroft (1996) and Esteves and Pastor (2001) suggested training users and the project team were critical success factors for ERP success.

The training strategy for ERP implementations commonly used in the Queensland Government is 'train the trainer'. Outside experts and IPs provide Client staff with training materials and guidance on the training process. The client staff would then be 'seeded' back into the user environment to run training courses and provide support. Ideally these would be personnel who were familiar with the business environment and had a sound grasp of the system's technical aspects. Unfortunately, market forces attracted such people away to join consulting firms, diluting the expertise in the training pool.

Under the old QGFMS regime (Dun & Bradstreet) training was run centrally by FISB senior consultants who had a strong grasp of the software and practical experience in its application. In the new SAP environ, FISB training staff were relatively inexperienced in all aspects of the application: support, implementation and operation.

Client vs. IP: Client staff ranked this issue at 9th position in the top quartile while IP staff ranked this issue at 23rd in the 3rd quartile. The difference in rankings could be explained by the fact that IP staff were responsible for the development of training strategy, training materials and in some cases delivery of training. Client staff, for the most part, were the recipients of the training. They were affected by the consequences of the training methods and management and therefore more sensitive to this issue.

Operational vs. Strategic: Operational staff ranked this issue at 14th in the second quartile while Strategic staff ranked this issue at 25th in the 3rd quartile. Operational staff were more affected by the

consequences of the training, they being the personnel who had to bear the frustration of operating a system without the benefit of satisfactory training. Strategic staff were more likely to be 'information clients' of the operational staff ie. the recipients of reports generated by operational staff.

Chang (2002) reported similar outcomes in his study as did Dhaheri (2002) in his study of Oracle Financials in the Abu Dhabi government.

3.4 Help Desk SAP Knowledge was Inadequate

The respondents who rated this issue perceived that "Users AND/OR help desk personnel regard the SAP knowledge of the help desk personnel to be insufficient to meet the needs of help desk customers. This issue relates to the quality of the SAP knowledge of help desk personnel" (Round-Three Survey Instrument).

An example of a Round-One issue reported by a [Client-Operational] respondent in this category is: *Help Desk - At times it appears that the people who are there to answer the questions are not able to as they do not have a practical application of the system ...* A comment made in Round-Three by a [Client-Operational] respondent observed: *This was due to the knowledge transfer from the subject matter experts (SME) and the consultants to the helpdesk staff being very inadequate*.

3.4.1 Discussion

Help desks play a critical role in the support and maintenance of ERP. The breaking up of ERP support in the Queensland Government from a largely centralised model to a predominantly decentralised model had a large effect on the structure and management of help desks.

Users were used to the three-tiered centralised model of a local help desk, a central help desk in the Treasury Department provided by senior personnel with implementation and ongoing management experience, and through Treasury, tertiary assistance provided by the vendor. In the new de-centralised environment, a two-tiered support system eventuated. Staff in individual departments provided tier-one support. Initially Treasury provided tier-two support but this proved unsatisfactory as they had not developed sufficient capability to do so and this service was closed down. Tier-three support came from SAP or IPs. Survey respondents believed that the help desk staff were under-trained or that continuous turnover of

contracted help desk staff diminished their capability to support SAP.

Eventually, all the decentralised help desk support for SAP was combined into one organisation, CorpTech, in 2003. By 2007, this was outsourced to IBM.

Strategic vs. Operational: Strategic staff ranked this issue 28th in the 4th quartile of the rankings. Operational staff ranked it higher at 20th place probably because they were more affected by the lack of knowledge in help desk staff. Unresolved help desk queries usually result in ERP tasks not being fulfilled often creating frustration amongst operational staff.

3.5 The Help Desk was Under-resourced

The respondents who rated this issue perceived that "This issue relates to the quantity of help desk resources: particularly understaffing, lack of responsiveness, lack of staff looking after systems or knowledgeable help desk staff assigned to other duties" (Round-Three Survey Instrument).

An example of a Round-One issue reported by a [Client-Operational] respondent in this category is: *Resource allocation - Support unit under-resourced – staffing insufficient to both maintain and enhance*.

3.5.1 Discussion

It is difficult to predict the workload of help-desk particularly with a new application. If the service from help-desk personnel is slow, a user may perceive the help-desk knowledge to be inadequate, whereas the real problem is that there isn't enough staff to process help-desk inquiries. This issue reflects a quantitative lack of resources rather than a qualitative lack of knowledge resources.

Respondents ranked this issue quite low: 29th, and so in the bottom quartile.

Client vs. IP: Client staff ranked this issue at 26th, slightly higher than IP staff who ranked it at 34th. Client staff would have been more affected by the lack of resources in the help-desk explaining their slightly higher ranking.

Strategic vs. Operational: Operational staff ranked this issue at 25th, higher than Strategic staff who ranked it at 35th.

The difference in both Client vs. IP rankings and Strategic vs. Operational rankings is consistent with the differences in the issue *"Help Desk SAP knowledge was inadequate"*.

4 CONCLUSIONS

Like the previous major issue category, this category illustrates the importance of knowledge management to enterprise systems in organisations. Here, had sufficient attention been paid by organisations to the better management of knowledge, particularly in the training and help desk functions, the above issues may not have attracted the level of importance recorded by respondents during Round-Three of the modified Delphi study.

There are several knowledge sources addressed in this major issue category. These knowledge sources include: IP staff, training materials and trainers, and other users and the help desk staff (both internal and external). Knowledge flows from these sources to the system users so they can effectively operate the ERP for the benefit of the organisation. When barriers arise between the sources and recipients of ERP knowledge, issues such as those described in this section arise.

The issues in this category also make a distinction between the insufficient knowledge and insufficient resources to distribute this knowledge. Even when, for example, there is sufficient knowledge in the help desk function to address ongoing problems, there must also be sufficient numbers of staff to handle the support load. This distinction has not been made in prior studies.

ERP lifecycle knowledge-related issues account for the top categories in this major issues study, outranking other, sometimes more prevalent and commonly found issues, listed in the lower ranked factors.

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