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## A Change-Management Model for the Implementation and Upgrade of ERP Systems

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### Abstract

*This paper formulates a model of the most important mechanisms of effective change management in enterprise resource planning systems. This 'ERP Change-Management Model' was developed after a comprehensive review and synthesis of IT change literature that encompassed the fields of IT project management, business process reengineering, IT innovation adoption, and enterprise resource planning systems. Ten change management mechanisms were identified as important in motivating ERP users to embrace change and to learn to use an ERP system effectively. An adequate budget for change resources is the facilitating condition for these change management mechanisms.*

### Keywords

Enterprise resource planning, enterprise systems, change management, IT driven change, continuous change, ERP

### INTRODUCTION

The subject of this paper is change management during ERP implementations and upgrades. In this context, Lientz and Rea (2004: 9) define change management as, "...the approach to plan, design, implement, manage, measure, and sustain changes in business processes and work." Examining the change management, project management, business process reengineering, IT adoption and ERP systems literatures, it is clear that all stress the importance of change management in the implementation of IT solutions (Nah et al. 2003; Parr and Shanks 2000; Lientz and Rea 2004; Grover 1995; Grint and Willcocks 1995; Brynjolfsson and Hitt 1998). For example, Sherer et al. (2003) believes that many IT initiatives fail because they focus on implementing the solution rather than on the adoption of the solution. Similarly, Dyson et al. (1997) note that implementation of new technology is most effective when a systematic change management program is adopted. But when it comes to listing and ranking the factors most likely to lead to successful, systematic ERP change programs, there is much less agreement. For example, in the IT implementation domain, factors found to influence the success of IT implementation projects are: top management support, user involvement, management of user expectations, communication between users and IT professionals, and user participation (Sherer et al. 2003). In ERP projects, critical success factors (CSF) are: top management support, project champion, ERP teamwork and composition, project management, and change management (Nah et al. 2003). In terms of change management, the critical success factors are: overcoming resistance to change, effective communication, participation in change processes, self-efficacy for dealing with proposed changes, available support, and perceived impact of changes (Cobb et al. 1995; Wanberg and Banas 2000) and sponsorship from top management (Sherer et al. 2003). Finally, in the BPR literature, the CSFs are: senior management commitment, realistic expectations, empowered and collaborative workers, strategic context of growth and expansion, shared vision, sound management processes, appropriate people participating full-time in the project and a sufficient budget (Bashein and Markus 1994).

These various lists of CSFs, from diverse yet related domains, makes it difficult to decide which are likely to be the key determinants of change management success in ERP implementation and upgrades. The purpose of this paper, therefore, is to synthesise findings from the IT change literature from the fields of IT project management, business process reengineering, IT innovation adoption, and ERP systems. The research question posited is:

*What are the most important mechanisms of effective change management in the implementation and upgrade of ERP systems?*

The technique used for answering this question was to conduct an extensive review of the project management, business process reengineering, IT innovation adoption, and ERP literatures. The focus of the review was on IT-enabled change, where IT was a fundamental component of a change project in the organisation. Twenty-five studies were identified that discussed elements of change management or change management critical success factors in the context of such IT-enabled change. These studies are summarised in Table 1. From these studies, eleven factors were identified as common to many studies (all factors identified in Table 1 were mentioned in at

least four studies). Those factors were then included in the model of *'Mechanisms of Effective Change Management'* shown in Figure 1. The model in Figure 1 is the answer to the research question posed above, and the primary contribution of this paper. It is planned that subsequent work will test this model, but no empirical tests are reported in this paper.

|                               | 1                       | 2                         | 3                  | 4                     | 5                                  | 6                      | 7                        | 8                  | 9                 | 10                  | 11                    |
|-------------------------------|-------------------------|---------------------------|--------------------|-----------------------|------------------------------------|------------------------|--------------------------|--------------------|-------------------|---------------------|-----------------------|
|                               | <i>Change Resources</i> | <i>Executive champion</i> | <i>Change team</i> | <i>Project Vision</i> | <i>Change Readiness evaluation</i> | <i>Change strategy</i> | <i>Stakeholder Input</i> | <i>Communicate</i> | <i>Incentives</i> | <i>ERP Training</i> | <i>Post implement</i> |
| Agarwal & Tanniru (1996)      |                         | x                         |                    |                       |                                    |                        |                          |                    |                   |                     |                       |
| Bancroft & Sprengel (1998)    |                         | x                         |                    |                       | x                                  |                        |                          | x                  |                   | x                   |                       |
| Bashein & Markus (1994)       | x                       | x                         | x                  | x                     |                                    | x                      |                          | x                  |                   |                     |                       |
| Benjamin & Levinson (1993)    |                         | x                         |                    |                       | x                                  | x                      |                          |                    |                   |                     | x                     |
| Boddy & Macbeth (2000)        | x                       |                           | x                  |                       |                                    |                        |                          |                    |                   |                     |                       |
| Christenson & Walker (2004)   |                         |                           |                    | x                     |                                    |                        |                          | x                  |                   |                     |                       |
| Dong (2000)                   | x                       |                           |                    |                       |                                    | x                      |                          |                    |                   |                     |                       |
| Dyson et al. (1997)           |                         |                           |                    |                       |                                    |                        | x                        |                    | x                 |                     |                       |
| Hill & Collins (1999)         |                         |                           |                    | x                     |                                    |                        |                          |                    |                   |                     |                       |
| Ho et al. (2004)              |                         | x                         | x                  |                       |                                    |                        | x                        |                    |                   | x                   |                       |
| Joshi (1991)                  | x                       |                           |                    |                       | x                                  |                        | x                        | x                  | x                 | x                   |                       |
| Klein & Sorra (1996)          |                         |                           |                    |                       |                                    |                        | x                        |                    | x                 | x                   |                       |
| Kotter (1995)                 |                         |                           | x                  | x                     |                                    | x                      |                          | x                  |                   |                     | x                     |
| Lee & Kim (1998)              |                         |                           |                    |                       |                                    | x                      |                          |                    |                   |                     |                       |
| Lientz & Rea (2004)           |                         |                           | x                  |                       | x                                  | x                      | x                        | x                  |                   |                     | x                     |
| McAdam & Galloway (2005)      |                         |                           | x                  | x                     |                                    |                        |                          | x                  |                   | x                   |                       |
| McNish (2002)                 | x                       | x                         | x                  |                       |                                    |                        |                          | x                  |                   |                     |                       |
| Nah, Zuckweiler & Lau (2003)  |                         | x                         | x                  |                       |                                    |                        |                          | x                  |                   | x                   |                       |
| Paper & Chang (2005)          |                         | x                         |                    | x                     |                                    | x                      |                          | x                  | x                 | x                   |                       |
| Robey, Ross & Boudreau (2002) |                         |                           |                    |                       |                                    | x                      |                          |                    |                   | x                   | x                     |
| Ruta (2005)                   |                         | x                         | x                  |                       |                                    |                        |                          |                    |                   |                     |                       |
| Sherer, Kohli & Baron (2003)  |                         | x                         |                    |                       | x                                  |                        |                          | x                  |                   |                     |                       |

|                             | 1                       | 2                         | 3                  | 4                     | 5                                  | 6                      | 7                        | 8                  | 9                 | 10                  | 11                    |
|-----------------------------|-------------------------|---------------------------|--------------------|-----------------------|------------------------------------|------------------------|--------------------------|--------------------|-------------------|---------------------|-----------------------|
|                             | <i>Change Resources</i> | <i>Executive champion</i> | <i>Change team</i> | <i>Project Vision</i> | <i>Change Readiness evaluation</i> | <i>Change strategy</i> | <i>Stakeholder Input</i> | <i>Communicate</i> | <i>Incentives</i> | <i>ERP Training</i> | <i>Post implement</i> |
| Skok & Legge (2002)         |                         | x                         |                    |                       |                                    |                        | x                        | x                  | x                 | x                   |                       |
| Stoddard & Jarvenpaa (1995) |                         | x                         |                    | x                     |                                    | x                      | x                        | x                  |                   |                     |                       |
| Willcocks & Currie (1996)   |                         | x                         |                    | x                     |                                    | x                      |                          | x                  | x                 |                     |                       |
| <b>Total</b>                | <b>5</b>                | <b>13</b>                 | <b>9</b>           | <b>8</b>              | <b>5</b>                           | <b>10</b>              | <b>7</b>                 | <b>14</b>          | <b>6</b>          | <b>9</b>            | <b>4</b>              |

Table 1: The Mechanisms of Effective Change Management when Implementing and Upgrading ERP Systems

## ERP CHANGE-MANAGEMENT MODEL

Different authors have different views of the scope of the change management mandate. For example, in the book 'Breakthrough IT Change' (Lientz and Rea 2004) training is not included as part of the change management function. Al-Mashari and Zairi (2000), on the other hand, included training and education indicating that change management involves the following tasks: creating a culture of change, revising reward systems, communicating, empowering, stimulating receptivity to change and training and education. Yet others (Robey et al. 2002; Benjamin and Levinson 1993) go beyond training and education to also include post-implementation activities, such as end-user IT support and post-change reviews, as part of the change function. In this paper, change management encompasses any activity that helps end-users to learn about, embrace and effectively use the ERP. Typically, these activities commence with the setting of the project's vision and end with any post-implementation activity that helps to improve, consolidate and institutionalise end-users' learning and acceptance of the system.

The ultimate dependent variable in the model in Figure 1 is the *individual employee's* capacity to use an ERP system effectively, not *organisational* capacity. Individual capacity to use an ERP system effectively is conceptualised as being measured by three variables: the individual's cognition, skills, and affective behaviours. These three variables are based on Kraiger, Ford and Salas' (1993) taxonomy of learning outcomes. *Cognitive outcomes* include user knowledge and cognitive strategies for problem solving. In relation to ERP systems, cognitive outcomes refers to knowledge about business processes, how these are connected to other business processes, as well as the overall 'big picture' of what an ERP system is and how it benefits the organisation. This knowledge helps the user to transfer learning to new situations (Gupta and Bostrom 2006). *Skill-based outcomes* focus on the user's ability to use the ERP to complete tasks or business processes. *Affective outcomes* refer to user's attitude to the system, willingness to embrace change, satisfaction with training, perceived usefulness of the application, motivation to use the ERP effectively, perceived anxiety in engaging with the ERP, etc. (Gupta and Bostrom 2006).

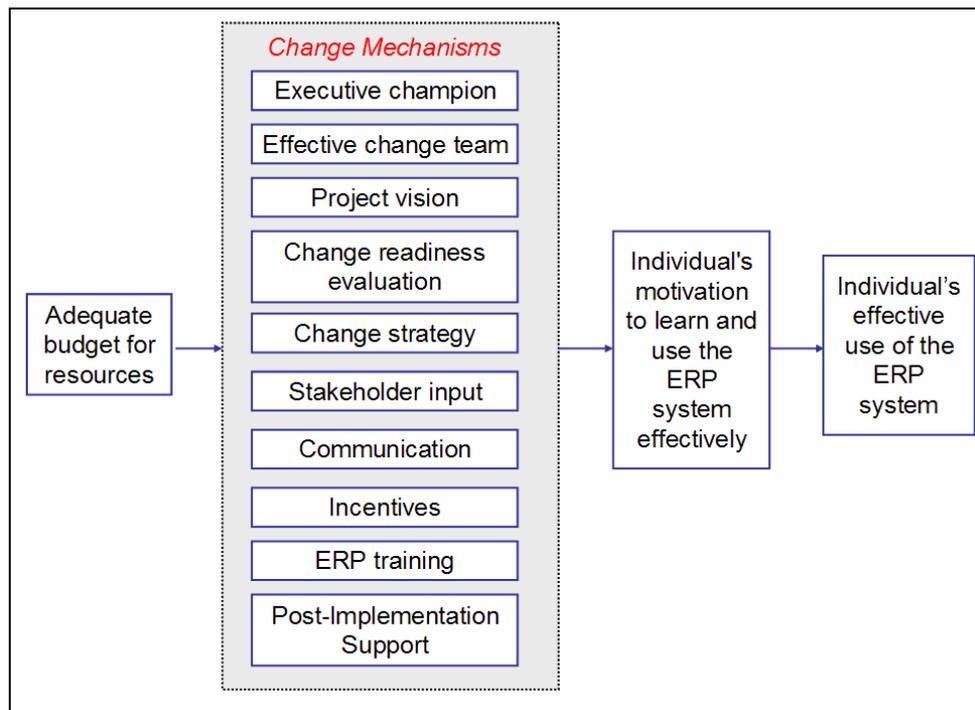


Figure 1: A Change-Management Model for the Implementation and Upgrade of ERP Systems

Moving left in Figure 1, it is hypothesized that an employee's capacity to use an ERP system effectively is driven in large part by an employee's *Motivation to learn and use the system*. In other words, it is argued that ERP-using organisations engage in change-management practices to stimulate their employees' motivations to embrace change and to attend to learning to use the ERP system effectively (Lientz and Rea 2004). Robey et al. (2002) refer to "motivation to embrace change" as overcoming knowledge assimilation barriers. Seddon and Yang (2005) use the term "overcoming organisational inertia." In terms of Figure 1, motivation is conceptualised as an overarching term that includes the individual's preparedness to (a) to try to use a new system, (b) attend to ERP learning prior to implementation and after go-live, and (c) continue to try to improve their usage of the system in the years after go live. With respect to this last point, it is important to continuously motivate employees to use the ERP effectively in the years after go live. Once new business processes have become established and stabilised, they become routine and embedded within the organisation (Newell et al. 2003), and the desire to learn to use the ERP system more effectively is often inhibited. Several studies have found that trainee's motivation to learn and attend training has an effect on their skill acquisition, retention of knowledge, and willingness to apply these knowledge and skills on the job (Martocchio and Webster 1992; Tannenbaum and Yukl 1992).

Based on the analysis summarised in Table 1, it is also hypothesized in Figure 1 that there are ten mechanisms for stimulating an employee's *motivation* to embrace change and to attend to learning how to use the ERP effectively. These ten change-management variables (and the adequate budget variable, which does not directly influence employee motivation) are now discussed in turn.

### Adequate Budget for Resources

On the far left of Figure 1, the variable adequate budget for resources recognises the importance of an adequate budget as the foundation upon which the extent of the change mechanisms is determined. Change resources refer to the financial, human, technological, and capital assets utilised by the change effort. Referring to Table 1 (Column #1), five studies mention the need for adequate change resources. For examples, top management demonstrate a commitment to the implementation project by allocating sufficient resources to see the project to its successful completion (Dong 2000; Igbaria and Guimareas 1994; Bashein and Markus 1994). A lack of commitment to resources could lead to resistance to change (Grover et al. 1995; Igbaria and Guimareas 1994). Hirt and Swanson (1998) found that management's commitment to resources was instrumental in facilitating implementation processes. Bashein and Markus (1994) wrote that in order to achieve breakthrough improvements, a company required an adequate budget. Boddy and Macbeth (2000) found that project success was significantly related to senior management's ability to accurately estimate the amount of resources needed to implement change; while McNish (2002) indicated that resources should be made available to resolve practical difficulties as soon as they arrive.

### **Executive Champion**

An executive supporter of the ERP initiative is an important motivator for change. In Table 1, thirteen studies acknowledged the contribution of top management support to successful change efforts (Column #2)<sup>1</sup>. Nah et al. (2003, p.13) wrote: "A project champion is more important in ERP implementations than in other IS implementations because ERP success hinges on overall organisational commitment and perseverance." Other authors viewed top management intervention as critical to successful change management (Paper and Chang 2005; Al-Mashari and Zairi 2000; Bashein and Markus 1994). This intervention includes active involvement in the planning and execution of the change initiative, communication of the project vision, adequate budget for education, training and technology, and providing incentives and rewards for change (Paper and Chang 2005; Kotter 1995). Bancroft et al. (1998 p.136) stated that: "Numerous executives can be supportive of a project, yet fail to provide real hands-on leadership and commitment". The difference between formal support and active commitment for a project may make the difference between project success and project failure (Bancroft et al. 1998).

Another important role of top management in the change process is the fostering of mutual trust with the rest of the organisation (Ruta 2005). Top management is critical in directing, monitoring and controlling activities, as they are the only ones who can effectively remove cross-departmental political obstacles (Paper and Chang 2005). On the other hand, Davenport and Stoddard (1994) argued that top-down imperatives should be tempered with involvement from people along the process path as this helps process workers take ownership of the redesigned processes.

### **Effective Change Team**

Nine studies in Table 1 (Column #3) refer to the importance of an effective 'implementation' team (Robey et al. 2002; Bashein and Markus 1994; Ho et al. 2004), or an effective change management team. Unfortunately, in many cases it wasn't explicit whether change agents were an integral part of that implementation team. For the purpose of this paper, it is assumed that 'implementation' team includes change management agents. According to a survey by Jiang et al. (1996), having competent project team members is the fourth most important IS implementation success factor. Ross (1999) also emphasised the need for having the 'best' employees on the ERP implementation team. Boddy and Macbeth (2000) stressed the need for a clear organisational structure to manage change. The change team should be cross-functional, dedicated full-time to the task of managing change (Bashein and Markus 1994). Moreover, in selecting the team, the organisation should try and limit its dependence on consultants (Robey et al. 2002). The desirable traits of the change team are a collaborative work style (Bashein and Markus 1994), adequately skilled (McNish 2002; Bashein and Markus 1994; Lientz and Rea 2004), committed to the change effort (McNish 2002); and globally oriented with respect to ERP rollouts in multinational companies (McAdam and Galloway 2005). Lientz and Rea (2004) further listed skills such as problem solving, effective communicators, and knowledge of business processes – as the more generic skills required of change agents.

### **Project Vision**

A vision specifies what the implementation project is meant to achieve and how it can make a positive impact on the organisation (Christenson and Walker 2004). The vision helps to create a shared understanding about the contribution of IT to organisational competitive advantage (Reich and Benbasat 2000); and helps to mobilise employees to work towards achieving the vision (Bashein and Markus 1994). Eight studies in Table 1 (Column #4) indicated that establishing a 'vision' for the project is an important element of change management. A vision is of little benefit unless it is communicated to all levels of the organisation (Bashein and Markus 1994); this sharing of the vision is easier if the vision is articulated in a single, inspiring phrase that emphasises the desired outcomes (Bashein and Markus 1994; Christenson and Walker 2004). Other desirable qualitative characteristics of an effective vision are understandable, motivational and credible (Christenson and Walker 2004). For a vision to be effective, executive management must be seen to proactively sell the vision to key stakeholders (Clark et al. 1997). Furthermore, top management must lead by example and live by the rules laid down by the vision (Paper and Chang 2005). In some cases, change was more readily accepted when senior executives orchestrated a crisis whereby radical change was equated with the vision of business survival (Willcocks and Currie 1996; Stoddard and Jarvenpaa 1995).

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<sup>1</sup> It should be noted, however, that Boddy and Macbeth (2000) did not find statistical significance for top management support influence on project success, in the 100 firms surveyed about supply chain partnering projects. This finding, however, is anomalous with respect to the majority of other studies in Column 2 of Table 1.

### **Change-Readiness Evaluation**

Ideally, any change strategy is founded upon an evaluation of the organisation's readiness for change. Five studies in Table 1 (Column #5) discussed the importance of change readiness evaluation. For example, Benjamin and Levinson (1993) wrote that testing for organisational readiness for change is just as important as analysing technical feasibility; because support from a critical mass of end-users is needed to ensure effective change. Both the readiness for change and the capabilities for making that change must be present for successful implementation (Bancroft et al. 1998). Management of organisational change involves an assessment of the preferences and expectations of the affected parties, while altering expectations is a crucial part of the change process (Sherer et al. 2003). Joshi (1991) suggested identifying potential equity concerns of employees prior to implementation and then implementing change management techniques to improve those concerns. These techniques could be in the form of either altering actual inputs and outcomes (such as reward systems, training and involving users in the change process) or altering the perceptions of users via communication avenues.

### **Change Strategy**

A change strategy is a formal plan that details the organisational elements that will be affected by the change (people, processes, organisational structures, policies, technology infrastructure, reward systems, facilities and location of the work, and corporate culture), and the tactics for introducing that change (Lientz and Rea 2004). According to Dyson et al. (1997) implementation of new technology is most effective when a systematic change management plan is adopted. This plan must be tailored to the scope and pace of the ERP implementation (Dong 2000). The scope of the implementation is determined by whether it is a functional improvement or an enterprise-wide improvement (Dong 2000; Lee and Kim 1998); while the pace of ERP implementation is either evolutionary (ERP improvement) or revolutionary (ERP breakthrough (Stoddard and Jarvenpaa, 1995)). These distinctions are important since the more radical the change, or the greater the number of elements affected by the change, the greater the need for change management (Kettinger et al. 1997). As the pace of change moves from evolutionary to revolutionary the need for change management planning and intervention increases. Likewise, as the scope of change moves from functional to enterprise-wide, the need for change management planning and intervention also increases. Several authors (Stoddard and Jarvenpaa 1995; Dong 2000; Lee and Kim 1998) argue that different change management tactics are required for the different change management modes. With respect to Figure 1, it is conceptualised that different change management modes require a different emphasis on each of the ten change management mechanisms. This is, all mechanisms are important, however, the weighting of resources devoted to each mechanism should be adjusted to reflect the scope and pace of the ERP implementation.

In Table 1 (Column #6) most authors advocate an incremental (evolutionary) approach to implementing either BPR or ERP (Robey et al. 2002; Paper and Chang 2005; Bashein and Markus 1994; Willcocks and Currie 1996; Benjamin and Levinson 1993). Some authors further suggest that organisations should aim for projects that garner 'quick' results (Paper and Chang 2005; Kotter 1995; Bashein and Markus 1994) as this helps build competence and confidence for future rollouts. As Bashein and Markus (1994) say: "A quick success can lessen fear, get people on the bandwagon, and generate enthusiasm." Willcocks and Currie (1996) suggested that there was a need for rapid completion (preferably within 12 months) to help maintain momentum coupled with commitment and enthusiasm for the project.

### **Stakeholder input**

Seven studies (Table 1, Column #7) outlined how facilitating stakeholder input is beneficial to the change management effort. For example, by getting key players involved from project inception, an organisation can reduce resistance to change (Skok and Legge 2002; Ho et al. 2004; Lientz and Rea 2004). Dyson et al. (1997) found that people responded favourably to the implementation of new technology when others listened to their suggestions and requirements; while it is imperative that employees' concerns and complaints about change are responded to expediently (Klein and Sorra 1996). Joshi (1991) discussed the importance of establishing fair procedures for introducing change through user involvement and participation, bargaining, and negotiation with trade unions. Lientz and Rea (2004) advocate involving stakeholders in setting the objectives of the change effort to assist with their subsequent buy-in of the project.

### **Communication**

The majority of studies in Table 1 (Column #8) discuss the importance of communication to educate about the project vision, to inform about the implementation project and to help overcome resistance to change. In essence, different change strategies require different communication approaches. Revolutionary change tactics indicate that communication should be first targeted to a small group of gatekeepers and spread only after the change has taken hold in that group (Stoddard and Jarvenpaa 1995). Whereas, evolutionary change tactics advocate

widespread, frequent and open communication as a key tactic to enable incremental change (Stoddard and Jarvenpaa 1995). All studies outlined in Column #6 of Table 1, implicitly advocated an evolutionary approach with respect to communication tactics. The most commonly cited desirable qualities of communication were: open, extensive, frequent, positive, honest, credible and relayed through multiple channels.

Employees at all levels who are affected by the new system need to be informed by a rigorous communications program (Bancroft et al. 1998). In terms of frequency of communication, Bashein and Markus (1994) believe that it is near on impossible to communicate too often. Willcocks and Currie (1996) advocate a continuous communication flow, while Sherer et al. (2003) suggest that communication should be targeted to project completion. Moreover, the key to success is repetitiously informing people about the change and molding their expectations (Bancroft et al. 1998). Credible communication is also an important motivating factor. Kotter (1995, p.63), for example stated: "Without credible communication, and a lot of it, the hearts and minds of the troops are never captured." Kotter also suggested that communication comes in the form of both word and deeds; senior management should also convey meaning through their actions, because when words and actions are incongruent, change is undermined.

Furthermore, it is important that communication highlights the positive aspects of the implementation project. Bashein and Markus (1994) found that BPR projects that are perceived in terms of growth and expansion, as opposed to downsizing or cost cutting, have a higher chance of success because they generate more enthusiasm and less resistance. McNish (2002) discovered that the benefits derived from the change ought to be widely publicised; while McAdam and Galloway (2005) found that lack of communication of the localised benefits of the ERP system led to a lack of commitment to the change by over half of the management team.

### **Incentives**

Six studies (Table 1, Column #9) mentioned providing incentives and/or disincentives to help employees overcome resistance to change. According to Klein and Sorra (1996): "The fundamental organisational challenge of innovation implementation is to gain targeted organisational members' use of an innovation; to change users' behavior" (p.1058). One method to cultivate and encourage targeted users' effective use of an ERP is to offer incentives (Klein and Sorra 1996). Dyson et al. (1997) found that administering incentives was the most significant factor contributing to the effectiveness of a large US company's reengineering effort (Dyson et al. 1997). Some authors detailed the type of incentives that could be offered to staff. For examples, Joshi and Lauer (1999) (see also Joshi 1991) suggested offering higher pay to those assigned to higher-level, skilled jobs or offering revised titles. Moreover, overtime pay was recommended to cover the extra work during the changeover phase (Joshi and Lauer 1999). Other types of incentives included cash awards, letters of merit, certificates of recognition, 'plush' treatment during IS training, and praise by managers and supervisors (Joshi 1991; Joshi and Lauer 1999; Klein and Sorra 1996). Willcocks and Currie (1996) outlined how a major BPR effort was able to overcome human resource concerns by the ease through which job reductions were facilitated via early retirement and job redundancy schemes.

Not only should incentives be offered to help staff overcome resistance to change, incentives also help to retain key implementation staff. A major problem associated with large IS projects, such as ERP implementations, is the acquisition and retention of highly skilled staff (Skok and Legge 2002). Monetary rewards like bonuses and share options, as well as non-monetary rewards such as recognition and career development can facilitate the retention of key staff and shore up project continuity (Skok and Legge 2002).

### **Training**

Nine studies in Table 1 (Column #10) referred to the relevance of training in the change management program. Successful implementation of an ERP system requires the effective transference of ERP knowledge to management and process workers via training and education (Davenport 1998). User education and training is a significant critical success factor of ERP implementations (Nah et al. 2003). The lack of user training has been cited as the 'smoking gun' of several failed ERP implementations (Wheatley 2004). Training should be readily and broadly available to encourage ERP acceptance and use (Klein and Sorra 1996). For example, a key implementation issue in McAdam and Galloway's (2005) study of managements' perceptions of an ERP implementation, was the limited, practical ERP training. In particular, managers desired to learn more about SAP, how to use it more effectively, and desired a more systematic training approach (McAdam and Galloway 2005).

It is important to consider both practical and conceptual skills when delivering ERP training. Not only do users need to learn how to use the new system, they also need broader-based, conceptual education about the ERP and its effect on business processes (Wheatley 2000; Robey et al. 2002). Paper and Chang (2005) noted that effective training helps people develop creativity, problem-solving and decision-making skills; ultimately

benefiting the entire organisation. A common strategy for ERP training is to train super-users from each functional area early in the project lifecycle. Super-users then return to their various departments and mentor other users (Ho et al. 2004). Super-users, therefore, are important in facilitating knowledge diffusion and fostering acceptance of changed work practices (Ho et al. 2004).

Training can also be used as a tool to help overcome some employee's resistance to change (Robey et al. 2002); as lack of self-efficacy in the proposed ERP can often lead to non-acceptance of the system (Compeau and Higgins 1995; Venkatesh and Morris 2000). Appropriate training and post-training assistance (for example, a help line) can also help reduce users' efforts and frustrations (Joshi and Lauer 1999).

### **Post-Implementation Change-Management Activities**

According to Table 1 (Column #11) four studies found that post-implementation activities support change. In the context of Cooper and Zmud's (1990) six level IT diffusion model (initiation, adoption, adaption, acceptance, routinisation and infusion), the focus of post implementation activities are on the routinisation of the ERP and its infusion throughout the organisation. In an ERP environment, routinisation occurs when the innovation is no longer perceived as something new and its use becomes part of normal activities; while infusion refers to the ERP being used to its fullest potential. Post-implementation activities, such as mentoring by super-users, training, help-desk support, end-user documentation, newsletters about ERP advanced features and functions, online help, etc., are instrumental in facilitating the routinisation and infusion processes of IT diffusion. For example, Robey et al. (2002) found system knowledge deteriorated due to the cessation of support efforts following implementation. Lientz and Rea (2004) argued that deterioration could be either unintentional or intentional. Intentional deterioration occurs when employees, attempting to bring the system back to its old state, institute changes (Lientz and Rea 2004). Robey et al. (2002) outlined how some users learn to work-around ERP requirements by devising improvised practices and reinventions of the technology. Post-implementation support activities are a solution to these problems. Other initiatives may include implementing formal methods for approving changes, implementing awareness workshops on maintaining the integrity of processes, and measuring processes to detect exceptions and workarounds (Lientz and Rea 2004).

Furthermore, ongoing post implementation change management activities are necessary to help maintain a competent end-user base. Over time, most organisations experience employee attrition, new hires and employees changing roles within the organisation. For example, the Australian Bureau of Statistics (2004) found the average annual staff turnover rate in Australia is 14% per annum. At the same time, the ERP system is constantly evolving as organisations seek to optimise business processes, extend integration capabilities, and leverage decision-making potential of the software (Davenport, Harris and Cantrell 2002, 2004). This dynamic ERP environment necessitates ongoing change management intervention (Meta Group 2003) long after go-live.

## **DISCUSSION AND CONCLUSION**

The motivation for this paper was the desire to reconcile the diverse findings reported in the literature on change management; as many different factors have been reported to be important. It was hoped that by comparing and contrasting factors that prior studies of IT innovation adoption, ERP, BPR and IT project management had found to be important, it would be possible to identify a strong list of factors that change managers could use in their ERP implementation and upgrade programs.

The contribution of this paper is the *ERP Change Management Model* in Figure 1. The model identifies ten important mechanisms associated with effective change-management practice. It is described as an "ERP" change-management model because 13 of the studies analysed are from the ERP literature. However, since 12 studies are from the general IT literature, it seems likely that the factors also apply to change management more broadly. Further, it is suggested that the factors in Figure 1 are important in both initial ERP implementations and subsequent upgrades. ERP system upgrades typically involve less change (most upgrades represent evolutionary as opposed to revolutionary change), but since most upgrades do lead to process change, it is argued that organisations still need to include change management initiatives in their upgrade planning.

A key element of the model in Figure 1 is the inclusion of the individual employee's *Motivation to learn and use the system* variable as an intervening variable between the organisation's change management efforts and individual capacity to use the system. The reason for including this variable is that it provides a theoretical mechanism for explaining how and why factors such as 'executive championship' and a 'strong change-management' team affect the ultimate goal of having employees in the organisation who can and do make effective use of the ERP system. The central idea in the model is that the ten different change-management factors can all help motivate individual employees to learn and use the new ERP system; and that motivated employees will make the effort to become effective users. Clearly, other factors such as each employee's prior knowledge of computing, capacity to learn, access to learning materials are also important determinants of

individual capacity to use an ERP system effectively. So it is not argued that motivation is the only independent variable affecting individual capacity. However, it is argued in Figure 1 that change management efforts affect individual capacity to use an ERP system effectively primarily through motivation.

Further directions for research may include: (a) an analysis of the optimum resources that should be applied to each of the change management mechanisms; (b) an analysis of how the scope and pace of ERP change affect the weightings of change resources devoted to each mechanism; and (c) an empirical test of the validity of the ten change management mechanisms shown in Figure 1.

## REFERENCES

- Australian Bureau of Statistics (2004). Labour Mobility Survey. Cat. 6209.0 pp.1-48.
- Agarwal, R. and M. Tanniru (1996). Organisational Receptivity to Change and Success in Process Reengineering. International Conference on Information Systems.
- Al-Mashari, M. and M. Zairi (2000). "Creating a fit between BPR and IT infrastructure: A proposed framework for effective implementation." International Journal Of Flexible Manufacturing Systems 12(4): 253-274.
- Bancroft, N. H., H. Seip and A. Sprengel (1998). Implementing SAP R/3: How to Introduce a Large System Into a Large Organisation. Greenwich, Manning Publishing Co.
- Bashein, B. J. and M. L. Markus (1994). "Preconditions for BPR success." Information Systems Management 11(2): 7-.
- Benjamin, R. I. and E. Levinson (1993). "A Framework for Managing IT-Enabled Change." Sloan Management Review: 23-33.
- Boddy, D. and D. Macbeth (2000). "Prescriptions for Managing Change: A Survey of Their Effects in Projects to Implement Collaborative Working Between Organisations." International Journal of Project Management 18: 297-306.
- Brynjolfsson, E. and L. M. Hitt (1998). "Beyond the Productivity Paradox." Communications of the ACM 41(8): 49-55.
- Christenson, D. and D. H. T. Walker (2004). "Understanding the Role of Vision in Project Success." Project Management Journal 35(3): 39-52.
- Clark, C. E., N. C. Cavanaugh, C. V. Brown, et al. (1997). "Building change-readiness capabilities in the IS organisation: Insights from the Bell Atlantic experience." MIS Quarterly: 425-454.
- Cobb, A., R. Folger and K. Wooten (1995). "The Role Justice Plays in Organisational Change." Public Administration Quarterly 19: 135-151.
- Compeau, D. R. and C. A. Higgins (1995). "Computer Self-Efficacy: Development of a Measure and Initial Test." MIS Quarterly 19(2): 189-212.
- Cooper, R. and R. Zmud (1990). "Information Technology Implementation Research: A Technological Diffusion Approach." Management Science 36(2): 123-139.
- Davenport, T. H., D. W. De Long and M. C. Beers (1998). "Successful Knowledge Management Projects." MIT Sloan Management Review 39(2): 43-57.
- Davenport, T. H., J. G. Harris and S. Cantrell (2002). "The Return of Enterprise Solutions: The Director's Cut." Accenture.
- Davenport, T. H., J. G. Harris and S. Cantrell (2004). "Enterprise Systems and Ongoing Process Change." Process Management Journal 10(1): 16-26.
- Davenport, T. H. and D. B. Stoddard (1994). "Reengineering: Business Change of Mythic Proportions?" MIS Quarterly 18(2): 121-128.
- Dong, L. (2000). A Model for Enterprise Systems Implementation: Top Management Influences on Implementation Effectiveness. Americas Conference on Information Systems.
- Dyson, D., R. Doyle, J. Kidd, et al. (1997). Collaboration Issues in the Implementation of New Technology: A Study of Change Management. International Conference on Management of Engineering and Technology, Portland, Oregon USA.
- Grint, K. and L. P. Willcocks (1995). "Business Process Reengineering in Theory and Practice: Business Paradise Regained?" New Technology Work and Employment 10(2): 99-109.
- Grover, V. (1999). "From Business Reengineering to Business Process Change Management: A Longitudinal Study of Trends and Practices." IEEE Transactions on Engineering Management 46(1): 36-46.

- Grover, V., S. R. Jeong, W. J. Kettinger, et al. (1995). "The Implementation of Business Process Reengineering." Journal of Management Information Systems 12(1): 109-144.
- Gupta, S. and R. P. Bostrom (2006). End-User Training Methods: What We Know, Need to Know. SIGMIS-CPR '06, Apr 13-15, Claremont, California, USA.
- Hammer, M. and J. Champy (1993). Reengineering the Corporation: A Manifesto for Business Revolution. London, Nicholas Brealey Publishing.
- Harris, J. G. and T. H. Davenport (2006). New Growth from Enterprise Systems: Achieving High Performance through Distinctive Capabilities, Accenture.
- Hill, F. M. and L. K. Collins (1999). "Total quality management and business process re-engineering: A study of incremental and radical approaches to change management at BTNI." Total Quality Management 10(1): 37-45.
- Hirt, S. G. and E. B. Swanson (1998). "Adopting SAP at Siemens Power Corporation." Published Case, UCLA.
- Ho, C. F., W. H. Wu and Y. M. Tai (2004). "Strategies for the adaptation of ERP systems." Industrial Management & Data Systems 104(3-4): 234-251.
- Igbaria, M. and T. Guimaraes (1994). "Empirical Testing the Impact of User Involvement on DSS Success." Omega 22(2): 157-172.
- Jiang, J., G. Klein and J. Balloun (1996). "Ranking of System Implementation Success Factors." Project Management Journal 27: 49-53.
- Joshi, K. (1991). "A Model of Users' Perspective on Change: The Case of Information Systems Technology Implementation." MIS Quarterly: June 1991: 229-242.
- Joshi, K. and T.W. Lauer (1999). "Transition and Change During the Implementation of a Computer-Based Manufacturing Process Planning System: An Analysis of Using the Equity Implementation Model." IEEE Transactions on Engineering Management 46(4): 407-416.
- Kettinger, W. J. and J. T. C. Teng (1997). "Business Process Change: A Study of Methodologies, Techniques, and Tools." MIS Quarterly: 55-79.
- Klein, K. J. and J. S. Sorra (1996). "The Challenge of Innovation Implementation." Academy of Management Review 21(4): 1055-1080.
- Kotter, J. P. (1995). "Leading Change: Why Transformation Efforts Fail." Harvard Business Review: 59-67.
- Kraiger, K., J. K. Ford and E. Salas (1993). "Application of Cognitive, Skill-Based, and Affective Theories of Learning Outcomes to New Methods of Training Evaluation." Journal of Applied Psychology 78(2): 311-328.
- Lee, G.H. and Y.G. Kim (1998). "Implementing a Client/Server System in Korean Organisations: Interrelated IT Innovation Perspective." IEEE Transactions on Engineering Management 45(3): 287-295.
- Lientz, B. P. and K. P. Rea (2004). Breakthrough IT Change Management: How to Get Enduring Change Results. Massachusetts, USA, Elsevier Butterworth-Heinemann.
- McAdam, R. and A. Galloway (2005). "Enterprise Resource Planning and Organisational Innovation: A Management Perspective." Industrial Management & Data Systems 105(3-4): 280-290.
- McNish, M. (2001). "Guidelines for Managing Change: A Study of Their Effects on the Implementation of New Information Technology Projects in Organisations." Journal of Change Management 2(3): 201-211.
- Martocchio, J. J. and J. Webster (1992). "Effects of Feedback and Cognitive Playfulness on Performance in Microcomputer Software Training." Personnel Psychology 45: 553-578.
- Meta Group (2003). Gaining Continuous Value from ERP through a Comprehensive Education Strategy: A Meta Group White Paper: 1-17.
- Nah, F. F.H., K. M. Zuckweiler and J. L.-S. Lau (2003). "ERP Implementation: Chief Information Officers Perceptions of Critical Success Factors." International Journal of Human-Computer Interaction 16(1): 5-22.
- Newell, S., J. C. Huang, R. D. Galliers, et al. (2003). "Implementing Enterprise Resource Planning and Knowledge Management Systems in Tandem: Fostering Efficiency and Innovation Complementarity." Information and Organisation 13: 25-52
- Paper, D. and R. D. Chang (2005). "The state of business process reengineering: A search for success factors." Total Quality Management & Business Excellence 16(1): 121-133.

- Parr, A. and G. Shanks (2000). "A model of ERP project implementation." Journal of Information Technology 15: 289-303.
- Reich, B. H. and I. Benbasat (2000). "Factors that influence the social dimension of alignment between business and information technology objectives." MIS Quarterly 24(1): 81-113.
- Robey, D., J. W. Ross and M.-C. Boudreau (2002). "Learning to Implement Enterprise Systems: an Exploratory Study of the Dialectics of Change." Journal of Management Information Systems 19(1): 17-46.
- Ross, J. W. (1999). "Surprising Facts About Implementing ERP." IT Professional 1(4): 65-68.
- Ruta, C. D. (2005). "The application of change management theory to HR portal implementation in subsidiaries of multinational corporations." Human Resource Management 44(1): 35-53.
- Seddon, P.B. and Y. Yang (2005). "Key Project Success Factors and Benefits From Enterprise System Implementations: Lessons from Sapphire 2003, Working Paper, Department of Information Systems, University of Melbourne.
- Sherer, S. A., R. Kohli and A. Baron (2003). "Complementary investment in change management and IT investment payoff." Information Systems Frontiers 5(3): 321-333.
- Skok, W. and M. Legge (2002). "Evaluating Enterprise Resource Planning (ERP) Systems Using an Interpretive Approach." Knowledge and Process Management 9(2): 72-82.
- Stoddard, D. B. and S. L. Jarvenpaa (1995). "Business Process Redesign: Tactics for Managing Radical Change." Journal of Management Information Systems 12(1): 81-107.
- Tannenbaum, S. I. and G. Yukl (2002). "Training and Development in Work Organisations." Annual Review of Psychology 43: 399-441.
- Venkatesh, V. and M. G. Morris (2000). "Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and their Role in Technology Acceptance and Usage Behavior." MIS Quarterly 24(1): 115-139.
- Wanberg, C. and J. Banas (2000). "Predictors and Outcomes of Openness to Changes in Reorganizing the Workplace." Journal of Applied Psychology 85(1): 132-142.
- Wheatley, M. (2000) "ERP Training Stinks." CIO Magazine Volume, DOI:  
[http://www.cio.com/archive/060100\\_erp.html](http://www.cio.com/archive/060100_erp.html)
- Willcocks, L. P. and W. L. Currie (1996). "Information Technology and Radical Reengineering: Emerging Issues in Major Projects." European Journal of Work and Organisational Psychology 5(3): 325-350.

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