

THE PROCESS OF ENTERPRISE ALIGNMENT IN AN ERP PROJECT: A VIEW FROM THE TRENCHES

Stephen Corea

University of Warwick

Abstract

The smooth adoption and use of enterprise technologies is critical to the business operations of many companies today. Successful alignment between the business and enterprise technology elements of such organisation are a key pre-condition for effective performance. This exploratory study seeks to uncover key features of the nature and dynamics of alignment surrounding the implementation of an enterprise system project at an engine repair company. Prominent aspects of the nature of enterprise alignment during the ERP implementation were found to be as follows: (i) when evaluating the degree of alignment between business processes, organisational structures and enterprise systems, it appears important to consider the relationship between the physical or 'explicit' processes/structure of activity at the organisation and the 'implicit' processes/structure that are embedded within the technology; (ii) enterprise alignments involve trade-offs; and (iii) the process of alignment between staff roles and the technology system is driven by learning. These findings suggest useful ways to extend understanding of the complex nature of enterprise alignment.

Keywords: *alignment, process, enterprise, ERP, structure, roles.*

1 INTRODUCTION

The need to achieve successful alignment between the business and information technology (IT) components of organisations has long been a primary management concern (Boar, 1994). Numerous research studies have consistently placed it among the foremost issues on the agenda of senior management (Bergeron et. al, 2001). The key notion of alignment at stake has been seen to imply an effective fit or match in the relationship between the business and technical constituencies of an organisation: such as the relationship between strategic business goals and the aims of IT projects, or the relationship between employee work procedures and the use of automated tools and functionality in the workplace.

Understanding the nature of IT-organisational alignment has thus been a critical focus of information systems research. Well-established theoretical frameworks on alignment were formed in past studies, especially in the 1980s and 90s (e.g. Baets, 1992), when smaller-scale IT applications and non-integrated systems were the norm. It may be argued, however, that there is now a pressing need to revisit the nature and dynamics of alignment in relation to present-day organisations and newer generation technologies. This seems especially so in the case of the recent widespread uptake of large-scale, integrated suites of software such as ERP systems. Their adoption is often accompanied by pervasive changes and challenges in their

host organisations (Markus et al. 2000). There is a need for fresh understanding of alignment in relation to such encompassing, tightly-integrated systems.

This exploratory study sought to address this need, through a study of key features of the adjustment process implicated in one organisation's project of ERP implementation. The portfolio of issues and problems that surfaced in the course of this project provided an appreciation of the nature and dynamics of alignment surrounding the adoption of an enterprise system. These research findings suggest ways to extend our understanding of the complex nature of enterprise alignment.

2 THEORETICAL REVIEW

This section reviews fundamental theoretical conception, within the IS field, of the nature of alignment between organisational and technology elements. Major characteristics of alignment pertaining to the adoption of ERP systems are also highlighted.

Numerous IS empirical studies have emphasised the need for the business and IT-related elements (or processes) of organisations to be strongly aligned, as a pre-condition for operational effectiveness and achievement of strategic aims (Powell & Dent-Mitcallef, 1997). Correspondingly, several theoretical frameworks on IT-organisational alignment have been proposed (Scott-Morton, 1991; Henderson & Venkatraman, 1993; Boar, 1994). These frameworks identify various components or factors that make up an organisation and that need to function in a state of compatibility. A well-established theoretical model, whose main components may be seen fundamentally to underlie (or encompass) those of other key frameworks, is the organisational alignment model by Scott-Morton (1991), shown in Figure 1.

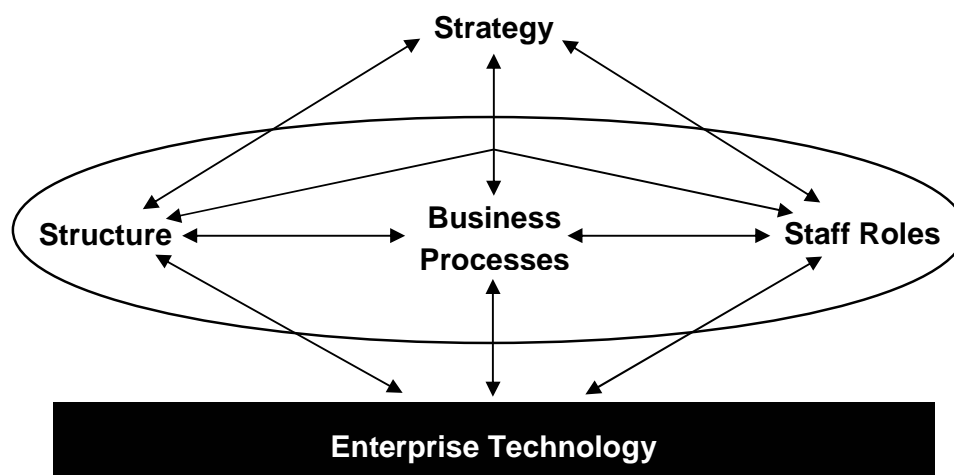


Figure 1. The organisational alignment model, adapted from Scott-Morton (1991)

This model poses five main aspects or elements which need to be aligned for effective organisational performance: strategy, business processes, enterprise technology, roles and (organisational) structure. Strategy implies the business aims and vision, proposed by senior-level management (Scott-Morton, 1991). The three components within the ellipse constitute the arrangement and mobilisation of work effort, and represent 'people issues' (Pollalis,

2003). Organisational structure refers to the way various business units, departments, staff groups and project teams are ordered and controlled, including the patterns of authority or responsibility. Business processes encompass operating procedures as well as the logic (i.e. business rules, policies) by which work inputs are transformed into outputs, and services performed and delivered. Roles designate the individual duties and work effort of company staff, and the knowledge and skills they bring to bear. Enterprise technology refers to the variously integrated 'platform' of IT systems that support the performance of activities and decision-making.

Conception of business-IT alignment in terms of these fundamental components (or between various sub-components and associated elements¹) has given rise to numerous research studies measuring the degree of fit between such factors (Bergeron et. al, 2001). However this notion of alignment, as simply a fit between discrete elements (or correlation between atomic factors) appears to be inadequate for characterising the complex nature of this phenomenon. Recent studies, for example, have argued that alignment is a dynamic process actively shaped by the actions of organisational actors, rather than a static relationship of structural fit (Hirschheim & Sabherwal, 2001; Truex et al., 1999). There is thus a need for further research to reveal key features of the nature and process of alignment, in terms of such key elements as pre-figured by the above model.

The recent universal uptake of ERP software also lends impetus to the need for greater understanding of alignment. The implementation of these systems has been seen to invoke a significant amount of challenges and disruption to work practices, due particularly to their tight coupling with organisational components, as well as the pervasive extent of changes they produce in business processes, workplace routines and structures (Umble et al., 2003; Parr & Shanks, 2000). Firms typically have to perform significant re-alignment of their processes, roles and organisational structures at a cross-functional level, in conjunction with the embedding of the new system.

A key feature of such alignment involves the adaptation of the firm to the dictates of the software. As ERP systems bring in highly standardised (and at times inflexible) workflow processes, organisations face difficult choices in abandoning previously non-standard, locally tailored ways of functioning to adapt to the strict logic and generic templates of their new system (Markus et al. 2000). Moreover ERP systems are often unable to replicate all the functionality of the legacy systems they replace, and thus mis-alignments may be induced in the wake of migration.

3 METHODOLOGY

This study sought to address the previously described need for further understanding of the nature of alignment with enterprise systems. An in-depth case study approach was adopted as an exploratory research strategy (Yin, 1994) aimed at understanding how the process of alignment surrounding the introduction of an enterprise system occurred. Permission was obtained from AeroRepair (a pseudonym), an aircraft engine maintenance and repair company, to study the issues and problems that emerged the organisation's implementation of an SAP ERP system.

¹ Other major frameworks of alignment (e.g. Henderson and Venkatraman (1993), have refined and extended the scope of these key elements in terms of sub-components or sub-processes (e.g. business processes vs. IS service processes, business vs. IS governance structures).

The case data was gathered via the following methods: (i) onsite interviews with members of the project team during multiple visits to the company, that coincided with intermediate project milestones during the nine months in which the project was implemented; (ii) review of company documentation as well as a log compiled by the project manager, that kept note of key issues and problems brought to the attention of the project team, especially during the course of user workshops and meetings. Data from interviews and fieldnotes was inductively analysed using the constant comparative method (Glaser & Strauss, 1967): subjected to repeated scrutiny to identify patterned regularities in the form of common themes, issues or dilemmas. Company documentation was also consulted to gain background knowledge of the firm's operations. The case study findings are presented next.

4 CASE ANALYSIS

This section begins with a brief background of the ERP project. This is followed by an analysis of key features that appeared to characterise the nature and processual dynamics of IT-organisational alignment in this project of ERP implementation.

4.1 Project background

In the space of about nine months, between January to September 2006, the AeroRepair company carried out the implementation of an SAP ERP system. The company is a service provider that carries out the maintenance, repair and overhaul of aircraft engines for various airline companies. The decision to adopt the new system had been driven by a need to replace the company's 20-year old legacy mainframe system (due to the impending phase-out of vendor support), as well as the desire to adopt the same ERP solution that AeroRepair's parent company was using (to facilitate integration).

As the production processes and environment of the parent firm were largely similar to AeroRepair's, Aerospace implemented its parent company's ERP solution, known as the 'Global Template' (GT), without much modification or customisation: nevertheless, a significant amount of configuration was necessary, to incorporate the needs of AeroRepair's own business processes, organisational structures, and legal/accounting standards. While the functionality of the GT solution was initially seen to cover only about 80% of the legacy systems to be replaced at AeroRepair, the company decided to go ahead with its adoption (guided by staff and consultants from the parent firm) on the expectation of lower risks of implementation and smoother transition to the new system.

The implementation project broadly occurred in three main stages. The first three months (Jan-Mar) involved introductory user workshops, business analysis activities and the data mapping between the legacy systems and the SAP modules, the second three months (Apr-Jun) with configuration activities and training of super-users on the new system, and the final 3 months (before going live at the end of September) were taken up with user acceptance testing, data uploading and organisation-wide training. On the whole, despite demanding deadlines, the implementation of the project was seen to have occurred fairly successfully, with the cutover to the new system occurring without significant hitches.

4.2 Nature of alignment

With reference to the archetypal elements of the organisational alignment model presented earlier, it was found that different features and dynamics characterising the nature of alignment surfaced in relation to the relationships between enterprise technology, business processes, organisational structure and staff roles. These are considered next.

4.2.1 *Relationship between business processes, organisational structures and enterprise technology*

An interesting characteristic of the form of alignment between business processes, organisational structures and the enterprise technology was seen to lie in the mediation of a relationship between *explicit* process/structure and *implicit* process/structure. Procedural-type information technologies like ERP systems are essentially formed by mirroring the human-performed business processes and organisational work structures at the physical level with ‘implicit’ automated processes and data objects within the technology, thus creating a referential correspondence and a tight coupling between the two processes (i.e. explicit and implicit). Given that the implicit processes and data objects within the ERP software are highly integrated cross-functionally, it was found that the implementation of the new system at AeroRepair acted as a “lever” to enable different business processes across different departments and units to work more in parallel (i.e. structurally), rather than sequentially as before. For example, with the new system, when a shop floor mechanic determines that certain engine repairs cannot be done in-house, he/she can now create a service order on the spot in the system (using predefined external vendors’ capability data), and immediately transport the components to the outbound logistics unit for shipment preparation (the created order can then be accessed in real-time by staff in the procurement and logistics departments). In other words, the implicit process structure with the technology allows for alignment in the form of a sort of ‘process re-aggregation’ to occur at the human level of business processes, via the unbundling of formerly sequential chains of activity.

This relationship between the explicit structure/processes in the organisational realm and the implicit structure/processes within the technology was also seen to have the capacity to permit negative impact or mis-alignment to occur, in the form of a sort of ‘process segregation’. For example, when a decision was made in the project, during the business analysis/configuration phase, regarding how many work-centres to establish (i.e. as part of the implicit organisational structure within the system), it was made based on a reporting perspective. It was resolved to allow fine and precise “reporting views” of the performance of different stages of the engine repair process. This led to the creation of a significant number of mini work-centres to distinguish different (short) legs of the overall process. However, the creation of such implicit structures in the ERP system on the basis of explicit structure (of the desired organisational reporting system) resulted in “long-winded” work-orders being created to correspond to such levels of detail. This was seen to cause inconvenience for front-line operating staff (who had to deal with overly-segmented work flows), as well as “unnecessary interruptions” to the production process. It left the project’s technical staff with an outstanding task of re-consolidating the work-centres and process definitions within the system after it had gone live.

Another key feature characterising the process of alignment was the existence of trade-offs. For instance (unlike the previous legacy system that did not have such capacity), the new ERP

system permits clear tracking of a typical engine repair cycle in terms of the current status (e.g. repair status, incurred man-hours at work centres etc.). While the system thus provides full visibility of 2000 plus orders in the workshop, this is incurred at the expense of a significant increase in data entry by staff. Staff feedback from the shop-floor indicated that the workload of some processes had been aggravated by the additional data capture requirements, despite the aid of barcode scanners as input devices.

4.2.2 Relationship between staff roles and enterprise technology

The most prominent feature of the nature of alignment between staff roles and technology in this project was the significant amount of learning activity it entailed for staff. This included learning the usage, capabilities and limitations of the new system, changing from a “mindset” of performing departmental functions to thinking in terms of “chain of effect”, as well as learning new work tasks in the light of redefined responsibilities brought about cross-functional integration. Some staff members were seen to have difficulty leaving behind old patterns of thinking habituated by use of the former system. This was seen, for instance, in the case of report-programming requests. With the previous legacy mainframe system (which could only display a limited amount of information on asynchronous terminals), many users had relied heavily on hardcopy printouts of daily or weekly batch reports to monitor workflows. Some of them could not adjust to the ability (and substitute work practice) of obtaining real-time detailed information from the new system’s GUI-based interface, and so had put in an inordinate amount of “unnecessary” requests for customised reports at the onset.

The learning-driven nature of alignment between roles and the new technology was somewhat impeded in the early stage by difficulties with unfamiliar jargon. This was manifested in the efforts of the project team staff to train users. Since most staff were very familiar with the previous legacy system and its terminology, the project team typically started off training sessions by explaining a glossary of terms translated from the nomenclature used in the legacy system to that of the new system. When understanding the new system required learning new concepts or a different form of ‘system logic’, the training staff explained these novel features of the new system using the old familiar terms. However, some staff members initially misunderstood the new features because they thought the novelty lay in name only (i.e. they assumed the underlying concept had not changed), or they could not grasp the differences in the logic of the ERP system. These initial training difficulties were compounded by a lack of familiarity of external consultant staff trainers with the legacy system.

One example was the initial confusion around the term “parts”, as used when referring to spare parts or components of an engine. Users were familiar with this term in the legacy system (e.g. “part numbers”, “part basics”), where it was a key concept around which repair-related applications were built. The counterpart in SAP terminology is “materials”, which was the term used in the standard materials management (MM) module that AeroRepair implemented to manage its various warehouse stock-related functions. However, the ability of staff to equate the term “material” with what they used to call a “part” was made difficult by a third term. Besides the “warehouse view” of parts, there exists a “technical view” of parts in the engineering context of the activities such as reparation, installation and the conformity to “modification”. There was still a requirement to maintain a “technical notion” (rather than a “warehouse notion”) of a parts in the context of AeroRepair’s engineering activities such as reparation and installation. This technical conception of “parts” was adopted in the SAP project management (PM) module that AeroRepair also implemented as part of its ERP

system. In order for the MM & PM modules to be integrated however, an additional object called “equipment”, which was new to the users, was introduced. Some staff members subsequently mistook the terms “equipment” and “material” to be synonymous. This misunderstanding was not obvious during the workshops at the early stage of the implementation process. Recognition that these terms were different only came about later on in the project, when the warehouse staff had to learn to understand the repair processes, and their counterparts – the maintenance staff – the inventory management processes. The ‘system logic’ behind the functioning of these data objects was also subject to difficulties of understanding.

The learning-based nature of effective re-alignment between staff roles and the new technology was also underscored in another way. The significant degree of difficulty in grasping the new system, which many staff members were seen to face in the user workshops and training sessions through the first half of the implementation processes, was deemed by the project team to be connected with the lack of appropriate training data that the staff were presented with – the fictitious data used in those instances (provided by the consultant/vendor staff) was seen to be too artificial and non-resembling of actual data used by the company. In contrast, there was seen to be a marked difference in terms of ease of understanding by staff during the ‘User Acceptance Testing’ and ‘Dress Rehearsal’ stages of the project, when actual company data and realistic scenarios were presented to users.

5 DISCUSSION: RETHINKING ALIGNMENT

In summary, the following main features of alignment in the implementation of an enterprise system project have been highlighted by the preceding analyses: (i) when evaluating the degree of alignment between business processes, organisational structures and the enterprise technology, it appears important to consider the relationship between the physical or ‘explicit’ processes/structure of organisational activity and the abstract or ‘implicit’ processes/structure that are embedded in the technology system; (ii) enterprise alignments involve trade-offs; (iii) the process of alignment between staff roles and the technology system are driven by learning. These insights are discussed next.

Previous studies have emphasised that enterprise systems can impose their own logic of rigidly standardised and generic functionality on the functioning of an organisation (Davenport, 1998). This study may be seen to help extend the understanding of this for the nature of technology-organisational alignment, by distinguishing between the implicit processes/structure in the underlying enterprise technology systems, and the actual business processes and structures at the organisational level (that they mirror). Given that the implicit structure and processes embedded within the technology can exert such a restrictive or disciplining influence on the way work practices are carried out, it follows then that there seems to be a need for developing newer models of alignment pertaining to enterprise systems that depart from past established frameworks of alignment in two main ways, as follows.

Firstly, these new models should avoid encouraging a treatment of technology and other elements like processes and structure as discrete and independent components, and instead support an understanding of such aspects as being embedded within (or inter-penetrating of) each other. One way perhaps would be to think in terms of organisational ‘complexes’, that have elements of structure, process, technology and work roles simultaneously bound up within them. The modular structure of enterprise systems can be seen as a source of

boundaries for demarcating such complexes, and mapping their alignment with each other, both at the explicit level of human processes and the implicit level of software.

It would be useful too if such models can represent the process of alignment in terms of trade-offs in addition to compatibilities (Majchrzak, 1997). It is vital to carry out the process of selecting and implementing the new ERP system with circumspection, to ensure that the new system's functionality supports the processing and information-provision needs of the organisation (Umble et al. 2003; Al-Mashari et al. 2003). This may be seen to require recognition of points of compromise and negotiation.

Secondly, given that the introduction of large-scale enterprise systems place engender a great deal of learning and behavioural adjustment among staff members in organisations, there appears to be a need for models or frameworks that can portray alignment occurring in a bottom-up fashion to represent these changes. Established frameworks of alignment in the past have tended to emphasize high-level business strategy as the pivotal element by which alignment is sustained, thus emphasising a top-down conception of alignment. However, as suggested by in this study's case data as well as other studies (Umble et al. 2003), the relationships between business processes, structure, technology and staff roles appear to be the prominent axes on which the alignment pertaining to an ERP project starts to take form and affect business performance.

This study uncovered key features of the process of alignment occurring during the implementation of an ERP project. It is important to recognise that such realignment as is generated during the course of an implementation does not end with the final roll-out of the new system. Instead, the process of alignment between the enterprise system and the organisational elements will continue to unfold and take shape through successive post-implementation phases of system's life-cycle (Markus et al. 2000).

6 CONCLUSION

Since enterprise systems affect most aspects of a company's operations, achieving successful alignment in the deployment of these technologies is critical to business performance (Markus et al. 2000). The results of this exploratory study suggest ways that current IS understanding of the process of alignment can be usefully extended through further theoretical and empirical work. It is hoped that the findings of this study will contribute towards motivating new research efforts aimed at clarifying this complex and vital aspect of technology-enabled organisational functioning.

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