A framework for integrating GroupWare technology and business process improvement

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Evaluative research on GroupWare technology in organisations has been concerned mainly with the effects and role of GroupWare as a new interactive medium replacing, or, for that matter, extending face-to-face communication in groups. GroupWare as a subset of Computer Group Support Systems (CGSS) has mostly focused on the benefits and drawbacks from a group interaction perspective. This narrow approach tends to disregard the enabling role and impact of some of the other invaluable functions of GroupWare, such as group access, and its contribution to information management and use within the organisation.

This paper explores the opportunities and constraints present in attempting to integrate GroupWare technology and business process improvement (BPI) in a public service department in one of the member states of the Southern African Development Community (SADC). Action research is used to facilitate the supportive and enabling role of asynchronous GroupWare in BPI initiatives.

The efficiency and effectiveness of the business processes may be achieved through asynchronous GroupWare support to group communication, as well as through several other publics (such as access to and sharing of historical information). Furthermore, it provides a repository and/or database of information about the business processes.

A framework is proposed that integrates GroupWare technology (Lotus Notes electronic mail system) with a BPI meta-process, and it is shown how this impacts on the efficiency and effectiveness of the department.

Introduction

Many organisations the world over are caught up in a massive restructuring not seen in the western hemisphere since the second industrial revolution, which introduced the factory system and dramatically changed all aspects of the agrarian economy. There has been an evolutionary wave towards information technology (IT), which is being described as a paradigm shift requiring a new context for leadership and management practice in all sectors of the global economy. Toffler (1980) describes this new paradigm as the “information age”. The information age represents a paradigm shift in the way organisations are organised and how they function. Six main elements may be said to impact on current organisational interactions: the global economy, the information highway, employee empowerment, the virtual corporation, a focus on core competencies, and a demand for quality and service delivery. The evolution of information technology is arguably therefore much more than an enabler of organisational efficiency. It may be viewed as one of the main aspects, or critical dimensions, of organisational survival in this age.

Consistent with the foregoing, organisations are defined as sets of interrelated business processes, each of which is composed of interacting agents, suppliers and secondary stakeholders. Their main goal is to transform the value chain with a view to transforming its inputs so as to produce valuable utilities in the form of deliverables and outputs for customers. The returns for the organisation are usually increased inflows of capital, market share and goodwill. This capital is then invested to supply further demand from customers, in a cyclic process (Goldratt & Fox 1986).

A new framework is therefore needed to assist the organisation in realigning its business and functional processes to maximise its potential and performance in the new age. The operating milieu generally consists of the information value chain, the technology dimension and the information dimension. These provide the glue towards organisational efficiency and effectiveness. Organisations that are classified as successful have business processes that are both efficient (an internal, operational perspective) and effective (an external, strategic perspective) — both being measures of productivity. Organisations can be viewed as efficient whenever there is an optimum balance between the capacity for generating outputs and the management of cost drivers. This must be in tandem with effective delivery of outputs, matching or exceeding the expectations of customers. The effective and efficient manage-


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ment of these factors enables organisations to sustain an equitable balance between production capacity and actual throughput.

The business landscape is changing continuously at an increasing rate (Goldratt & Cox 1986; Hammer & Champy 1993). Organisations are thus required to respond quickly to the market dynamics in order to remain competitive and successful. There is a need to adopt a strategy or framework in response to the new management cultures. Organisations of the future must learn to operate within this context. It is also posited that organisations need both radical and continuous changes in order to be productive (Davenport 1993a; Deming 1986).

For an organisation to maintain its competitive advantage, it must position itself so as to be able to respond timely and correctly to external changes. The context of the information age dictates that organisations should create local coping mechanisms at the team level in order to respond appropriately and quickly to external changes (Senge 1990). One instance of such decentralised mechanisms is business process improvement groups (BPIGs) (Hammer & Champy 1993), which are dealt with in more detail in this paper.

The focus of the next sections is on business process improvement (BPI) technologies. BPI technologies are identified and discussed in the context of the effect of GroupWare technology on organisational structure and culture. A model for decentralised learning along with the importance of BPIGs is also provided. The role of GroupWare in this context is described and illustrated on the basis of the experience of a public service department. A process model is used to explain the enabling role and effects of asynchronous GroupWare on BPI in that organisation. The limitations and implications of the model for future research are discussed in the last two sections.

Business process improvement technologies

BPI technologies have been considered one of the underlying change dynamic tools of some widely practised and researched, and sometimes revolutionary, management movements (Burke & Peppard 1995). The concept is not new, but it is in keeping with the new frontiers of management thinking. In fact, the much-lauded ‘Japanese economic revolution’ techniques were based on the concept of incremental process improvement (Deming 1986; Walton 1989). As management techniques, BPI technologies have arguably been the basis for major global organisational development approaches and structures (French & Bell 1990).

Although some texts denote BPI as an incremental business enhancement approach with a relatively small scope for change (in other words, sometimes retaining the existing processes in contrast to a more radical approach where there is not of necessity process innovation), the term ‘BPI technologies’ in the context of this paper is used to denote a vast family of process change and process innovation technologies, for instance, total quality management (TQM – a continuous process that is not necessarily of a radical nature), business process reengineering (BPR – radically changing the processes of the business) and business engineering (changing the very nature of the business), to name just a few.

The literature on BPI technologies suggests that there are continued efforts and successes in the application of the BPI approach to organisational problems (Davenport 1993b; Hewitt & Yoon 1996; Maull, Weaver, Childe, Smart & Bennet 1995; Ward 1994). For instance, the BPR movement suggests that working groups and teams should propose radical changes in business process redesign. It argues that these proposals should generate revolutionary quality and productivity improvements (Davenport 1993a; Hammer & Champy 1993).

Continuous and radical BPI have often been considered as opposite extremes on the same continuum. This fact has, in the past, led to the definition of a dual taxonomy (Davenport 1993a) and a range of BPI technology approaches, the main difference between which has been the degree of change sought and realised (Damanpour 1988; Dewar & Dutton 1986).

The BPI schema emphasise several themes, namely:
1. Teamwork (Deming 1986; Hammer & Champy 1993)
2. Process management (Harrington 1991)
3. Continuous improvement (Choi 1995; Choi & Liker 1995)

An amalgam of the last two factors can give rise to a new fourth factor, namely, a replacement of continuous improvement with discontinuous or breakthrough improvement from the third factor, and the addition of significant cost reduction – by BPR, for example (Hammer 1990) – to the fourth factor. The objective in such a case is either to catch up with or surpass global competitors. The role of key stakeholders, such as customers, suppliers and shareholders, helps to define this taxonomy.

Developing a business process model enables effective BPI efforts. Such a model illustrates how the activities in the organisation are currently performed. The BPI model is then used to find innovative approaches to business processes that can be improved to produce process quality and productivity (Harrington 1991). This model is interfaced with the BPI schema.

Business process improvement technology management

General BPI principles suggest that process improvement is best undertaken in organisations that adopt a process management philosophy. While there are many reasons for this, the primary one is that process improvement is both enabled and constrained by existing processes, organisational structures, and the existing technology base.

Process improvement management includes BPR as a corollary to the scientific approach to organisational redesign and the radical rethinking of existing processes, thus giving rise to BPI. For an organisation’s orientation, the elements of BPI thus exist to fulfill a defined mission. Arguably, if there is no mission, there is no need for the organisation’s existence. Processes that are purposefully designed around a mission fulfill that mission. If no processes exist, there is no way to fulfill the mission.

Process improvement actions and programs are generally required when one or more of four conditions occurs:
1. The mission of the organisation is changed or enhanced.
2. Customer needs, requirements or desires change in substantial ways.
3. Performance measures indicate that process performance is consistently below current standards of performance.
4. Performance standards are significantly raised to improve one or more of the four categories of measures: conformance to standards, fitness for purpose, process cycle time or process cost.
BPI actions and programmes are therefore not to be undertaken without reason or consideration for all performance elements – process, people and technology. Moreover, process improvement affects not only existing processes, but also the existing organisational and technological infrastructure. In any process improvement programme, all three elements should be the object of a carefully designed and skilfully executed change management programme.

BPI is a complex undertaking that demands leadership from the highest levels of the organisation and participation from virtually all executives, managers and professional employees (Daniels 1991). Davenport (1993a) posits five elements that together provide the techniques and tools to support the concepts of process improvement, and ultimately, process reengineering:

1. TQM principles and practices ensure high-quality products and services to both internal and external customers of business processes.
2. Industrial engineering provides process measures, controls on process efficiency and effectiveness, and standardised procedures.
3. Workflow design that incorporates the concurrent management of technological and human change.
4. Process redesign incorporates innovations and eliminates non-value-added time and costs from processes.
5. The introduction of competitive (aggressive) information technology enables superlative customer quality and service.

Process improvement management entails overseeing the way work activities, people and technology combine to produce useful outputs. Performance measures are used to evaluate process improvement management success with respect to standards of performance. Performance standards are derived from strategic and business (or functional) objectives and goals.

The scope of BPI management may be represented in a schema of three distinct levels of process improvement, namely:

1. Continuous process improvement (CPI) – Continuous process improvement is generally associated with the total quality management (TQM) discipline. The traditional approach is to empower self-managed teams to make task-level improvements in quality, cycle time and cost. This is closely akin to innovation of a simple process.
2. BPR – Process reengineering (or redesign) is the next level of improvement. BPR actions are undertaken in a project context with planned or specific improvement objectives. The focus is on streamlining processes by detecting and eliminating non-value-added process time and costs and incorporating best practices in whole or in part. Hammer & Champy (1990) explain that the effects of reengineering involve the “fundamental rethink and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed”.
3. Business engineering – Reengineering is often undertaken in response to dramatic changes in the external environment and on an organisational level (a paradigm shift, for instance) that place considerable pressure on the ability of the organisation to fulfil its mission, to improve its competitive positioning, or even to survive as an entity. Actions are radical and transforming. The focus is on the end-to-end process, or on a considerable subset of that process, and virtually all functions within the organisation are affected.

The three organisational elements or components involved in process improvement technologies at all three levels are process, people and technology. At the CPI level, people and technology are the focus of the BPI level. Process is the focus of improvement efforts. At the business engineering level, technology assumes primary importance. However, all three components are always part of every improvement effort. The differences are only of degree, importance and priority.

The concept of an end-to-end process improvement model with a supporting methodology seems to be the most expeditious way to implement Davenport’s (1993a) principles. Such a methodology would:

- Begin with a statement of mission, vision, objectives, goals and strategies.
- Produce a reengineered business process to support the stated organisational mission and related strategic and business plans.
- Continue through information systems design, deployment and operations consistent with the meta-model.
- Employ process management principles to ensure that process improvement gains are maintained.
- Focus on cultural and organisational change management issues and structural barriers to change that represent the most risk-prone component of process improvement efforts.

The meta-model orientation used in this framework comprises a study of group processes for BPI, and is therefore referred to here both as a group methodology and as a group process. As a meta-process, it is viewed as a high-level process that describes how process improvement can be carried out in organisations. The process improvement framework is dealt with elsewhere in this paper.

**Focusing on processes**

The new paradigm requires a meta-process model. This is designed to enable process improvement efforts within the organisation consistent with the established body of expertise for process improvement and best practice analysis.

The two components of process management are processes and functions:

1. A process is simply the largest unit referring to the flow of work through an organisation, beginning with external suppliers and ending with external customers. Along the way, value is added at each step through a series of transformations involving the consumption of resources within an established control (rule-based) framework (Porter 1985; Hart 1964).
2. A function is a specified type of work applied to a product or service moving within a process.

In a functionally driven organisation, processes are organised around structure or functions. In a process-driven organisation, structures and functions are organised around processes.

A business process can be subdivided into sub-processes, with lower level processes called ‘tasks’ or ‘activities’. These usually have some kinds of interdependent attributes (Dennis, Haynes & Daniels 1994). A business process is more fully understood if it is split into its various component activities. The interrelations between these activities are then examined to see how they affect the overall performance, efficiency and effectiveness of the business process. This is referred to in the literature as ‘modelling a business process’. The aforementioned model is relevant.
Business process improvement groups

From the above discussions on BPI technologies and BPI management, it follows that teams or working groups are the focus of the BPI group framework – resulting in the term BPIG to implement the BPI technologies. Moreover, all instances of BPI share common characteristics, such as their dependence on working groups. These working groups (BPIGs) have the following characteristics:

1. They are generally small groups, with between three and 12 members (Scoles 1994).
2. Their modus operandi is characterised by a process (King 1990).
3. They have defined roles (Rosenfeld & Servo 1990).

The study of a business process as an activity-based concept, and also as a value-adding unit, provides opportunities for a BPIG to better improve some of the attributes of the business process, such as service delivery, customer satisfaction, product quality, cost drivers, turnaround and throughput time, and process simplicity.

BPIGs facilitate organisational learning in terms of redesigning organisational units, such as business processes. Work teams arising from BPIGs usually enhance the communication dynamics and the sharing of information about organisational processes. This approach fosters team learning and recognises that “teams, and not individuals, are the fundamental learning units in modern organisations” (Senge 1990: 10).

The BPI schema is normally carried out with small groups or teams, the mandate of which is to analyse and propose improvement to business processes. Such initiatives can be anywhere on the BPI continuum, from incremental to radical (Hammer & Champy 1993).

GroupWare and business process improvement groups

Historically, the term ‘GroupWare’ came into general use in 1991 when it was the subject of a special report in PC Week (1991). In 1992, the first major conference on commercial computer-supported co-operative work (CSCW) focusing on GroupWare was held (Coleman 1992). McQueen (1993) added to the discussion by describing experiences of using GroupWare in New Zealand, and Lloyd clarified the implications for potential users of GroupWare technology within the next millennium. Within this perspective, however, cognisance must be taken of the fact that the first academic conference on CSCW was in 1986 (Lloyd 1994).

The term ‘GroupWare’ is often used as synonymous with commercial CSCW. In some instances, this is acceptable. The understanding must, however, be that CSCW is the over-arching discipline and should thus encapsulate both GroupWare and collaborative computing. The following definition is offered against the background that there are several loose conceptions on what GroupWare is. “GroupWare is the networked hardware and software, which enables people to support each other in their efforts to achieve their work goals, irrespective of when or where they might want to do this, while collaborative computing is the creation of collaboration systems, in which teams of people use GroupWare to help them achieve the goals of their groups and organisations” (Bate & Travell 1994).

GroupWare thus represents the hardware and software, the applications, of computer-based teamwork, and collaborative computing is the implementation of GroupWare in systems comprising people and networked computers. GroupWare comprises IT that is used to help people work more effectively. Bill Gates, chief executive officer of Microsoft, clarifies the debate on the value of GroupWare as follows: “It’s simply allowing everyone in your company to collaborate, allowing you to track everything you’ve done on a new product design, everything you’ve done with customers” (Gates 1994: 98). The prime purpose of GroupWare is thus that teams work towards specific organisational goals to improve business processes.

The authors of this paper largely agree with the above argument, but would further state that the use of GroupWare should include the analysis of organisational structure and culture, as well as an examination of how these should be changed and managed for the organisation to be successful. From the researched literature, it was found that GroupWare covers such a diverse area, with ever-increasing boundaries, that the best definitions of GroupWare are a convergence of six other definitions (Richman 1987; Johansen 1988; Olson 1989; Ellis, Gibbs & Rein 1991; McQueen 1993; Dale 1994), as in the following proposed definition: GroupWare is a generic term for computer-based systems that are networked to support groups of people engaged in a common task. These groups are usually small and have particular tasks with definite terms of references.

Understandably, then, GroupWare enables better support for teamwork by providing sophisticated communication and co-working facilities. It consequently has the potential to augment the efficiency and effectiveness of BPIGs by means of characteristics such as the following:

- Better support to group activities, for instance, by making communication faster and cheaper (Sproull & Kiesler 1991), reducing paper flow (Wilson 1991), making filing easier (Brothers, Hollan, Nielsen, Stornetta, Abney, Furnas & Littman 1992), increasing cross-departmental communication (Clement 1994), and better management of information flow through the office (Bate & Travell 1994)
- Positive effects on individual behaviour, such as reducing stress (Pietro 1992) and making individuals communicate more openly (Sproull & Kiesler 1991)
- Positive effects on group behaviour, for instance, by distributing individual contributions more evenly (Nunamaker, Dennis, Valacich, Vogel & George 1991), separating ideas from individuals (Chidambaram & Kautz 1993), reducing the repetition of old ideas, and increasing commitment to group decisions (Sheffield & Galuppo 1993).

Much of the published research in GroupWare systems has been on group decision support systems (DSS). Examples of tasks in such systems include brainstorming, voting, ranking and classifying ideas (Dennis et al. 1994). Synchronous communication is supported by group DSS. Events occur in coordination with one another, usually at specified times or simultaneously. This category of GroupWare systems is the opposite of asynchronous GroupWare. Asynchronous events occur at different times without co-ordination. Asynchronous systems allow users to interact at different times and from different locations, and include electronic mail, computer conferencing and workflow control systems.

GroupWare and business process improvement technology: A public service experience

The experience of a public service department in one of the Southern African Development Community (SADC) member...
states is investigated in this section to illustrate the concept of BPIGs and the impact of GroupWare technology. The department studied is the National Student’s Placement and Welfare (DSPW) arm of the Ministry of Education, responsible for pre-service tertiary level training.

The history of the DSPW can be traced back to the early days of independence when the country had only a handful of university-educated nationals. The department was first established as a small function within the ministry to facilitate the sponsorship of further education. It is primarily involved in assisting students in their placement, and providing them with financial assistance in the form of grants and loans. It also plays a major role in career guidance, serving to reconcile students’ career choices with the nation’s human resources requirements.

The courses sponsored are category-based to meet the country’s human resources needs. The amount spent on the courses is recoverable, either in part or in full, depending on the category under which the course is sponsored.

Typically, the entire financial assistance package to a student is treated as a loan until he/she successfully completes the course. The grant portion of the assistance, which need not be repaid, is based on the category into which the course falls. It is deducted from the amount of the loan when the student successfully completes the course. If a student discontinues a course, all costs incurred towards his/her education are treated as a loan.

Until the end of 1972, the scheme operated without a memorandum of agreement with the student and with no expectation that the student would make any financial contribution towards the continuation of the scheme. All that was expected of students was that they serve in certain sectors of the economy upon completion of their studies. In 1973, the government took a more proactive role in the training of local human resources in order to expedite the localisation process. In line with this undertaking, the government introduced a bursary scheme in terms of which students had to sign a memorandum of agreement requiring that they serve in designated sectors of the economy on completion of their studies and that they contribute 5% of their initial salary to the scheme.

The revised bursary scheme was applicable only to students that were being sponsored through the single national university. Those that were trained at other tertiary institutions – such as the National Health Institute (NHI), now the Institute of Health Sciences, or the national polytechnic, now the Faculty of Engineering and Technology of the state university – were required only to serve in certain sectors of the economy.

An organisational and methods (O&M) review report from the Ministry of Education in 1992 defined the objectives of the bursaries function and upgraded it to a department, the DSPW. The major objective of the DSPW was redefined as providing pre-service education and training at the post-secondary level, in order to produce the technical and professional manpower needed for the economy. Accordingly, the main functions were streamlined as follows:

- Policy and awards
- Student welfare administration
- Career guidance and counselling
- Departmental management.

The government introduced the grant/loan scheme in April 1995 following the recommendations of the Presidential Commission on the revised National Policy on Incomes, Employment, Prices and Profits in September 1990. The objective of the new policy was to expand the bursary scheme to cover all post-secondary pre-service training, as well as to introduce the element of cost recovery. This would serve to make the scheme self-sustaining, in other words, a revolving loan scheme.

The new scheme significantly increased both the clientele and the budget of the DSPW. It is against this background that the DSPW is now at the centre of the implementation and operation of the scheme. However, an inappropriate structure and inadequate resources that are not commensurate with the mandate and responsibilities of the department have grossly hampered the efficiency and effectiveness of the scheme.

Inability to learn and adapt to change

A review of the DSPW was necessitated by the numerous complaints from members of the public, including prospective grant/loan applicants, about the poor administration of the grant/loan scheme. Consequently, senior management decided to undertake a review of the DSPW with a view to strengthening and improving service delivery. By then, a consultant with experience in the administration of student loans had already been contracted by the DSPW to assist in finalising the modalities and administrative aspects of the implementation of the grant/loan scheme. In particular, the consultant was tasked with developing, designing and setting up a broad-based database system for the DSPW to increase its efficiency and effectiveness.

Against the advice of the Government Computer Bureau (GCB), senior management at the DSPW took the decision to develop software systems in-house to support their operations. This led the DSPW into a three-year project to develop a computer system designed to integrate the various aspects of its work. Ultimately the system had several limitations.

The computerisation consultancy was conducted in two phases, the first of which involved developing the functional specification document. This was done by analysing the needs of the DSPW and by working closely with other stakeholders, like the Government Computer Bureau. The second phase of the consultancy involved the implementation of the system as detailed in the project proposal. This phase had three parts: confirming the technology environment, designing and developing the grant/loan scheme, and implementing the system.

The system took more than three years of development to reach some level of efficiency, but by then the increased number of applicants had placed a great burden on the effectiveness of the DSPW, and the system is still not fully utilised.

Starting the business process improvement groups

The inability to motivate staff at the DSPW called for changes in the management approach. Some techniques for enhancing the level of participation in decision-making, such as brainstorming sessions, suggestion boxes and departmental meetings, were tried as efforts to promote participation and to campaign for ideas from staff on how to improve service delivery. None of these endeavours generated the expected gains, for two main reasons:

1. They were strictly based on the assumption that desk officers (front-line staff) should play an active role in management and the solution of problems, which is one of the several facets of process improvement. Desk officers
were, among other things, called on to participate in taking routine strategic decisions, irrespective of the type of decision, following an approach suggested by Semler (1989). This proved to be a counterproductive strategy, however, which seems to support the assumption that group decisions are not better than individual decisions. In fact, group decisions may delay the taking of decisions and may also be of lesser quality (Senge 1990). Strategic decisions – for example, to form partnerships with the private sector or to decentralise the functions – were found to be better made only by managers. Sharing the responsibility of taking decisions with large groups of staff that were not directly involved in decision-making on a daily basis simply delayed what could not afford to be delayed, thereby undermining the confidence of both staff and management in participatory management.

2. Business processes received low priority. For example, the whole set of interrelated activities involved in awarding a loan, signing a memorandum of agreement (loans contract) and recovering loans (credit control) – from gathering relevant applicant/student and human resources information to the analysis of programme quality assurance, as well as the care and welfare of students – was never discussed. The emphasis was staff participation in management activities, rather than analysing how activities were executed and how improvements could be attained. The ideas generated by the officers covered a broad range of subjects, from increased staff levels (so that there would be more hands to cope with the increased volume of work) to better wages. The broad range of subjects and the repetition of ideas progressively undermined the interest of managers, and consequently employee motivation, to generate new ideas.

One of the authors has been working as an organisational consultant with the public service in question for more than a year and a half and has an intimate knowledge of the operations of the DSPW. This enabled him to perform a study with action research characteristics (Elden & Chisholm 1993; McKernan 1991). The work began with an analysis of the organisation, and a set of changes at the management and operational levels was proposed.

Based on previous experience and on a methodology developed to implement group-based quality and productivity improvement, a project to establish BPIGs was planned and put into practice. It was pre-determined that all such groups established at the DSPW should complete a process-improvement proposal within a specified time. As opposed to BPR groups (Hammer & Champy 1993; Soles 1994), the BPIGs at the DSPW were not constrained in their composition, and the improvements sought were not expected to be radical.

The BPIGs had between one and eight weeks to complete the analysis and redesign of a business process. They were then expected to generate a proposal and hand it for evaluation to an improvement committee (which included one of the authors). If the proposal was considered to be attainable and likely to generate improvements in the operations of the DSPW, the BPIG would co-ordinate the appropriate staff functions to implement the proposed redesign.

Introduction of an asynchronous GroupWare system

The groups were initiated by an electronic mail message sent to the facilitator and copied to the group leaders, notifying them of their nomination and of the start of the asynchronous GroupWare system. Three months after this message and the consequent formation of BPIGs in the department, four BPIGs had successfully completed their assigned tasks and three others were still engaged in the process. (The department has the potential of accommodating between five and 12 BPIGs. Given the total staff size of 35, it is thus possible to convene at least 16 groups per quarter.) BPIs were proposed by three of the BPIGs. The fourth group, however, proposed only some incremental changes, based on business processes but rather on business process (BP) analysis. In other words, the solutions were based on problem analysis, which is consistent with the results of previous research (Dennis et al. 1993). At most, ten officers per session, including all staff members, were trained in the concept of BPI (with the main objectives of learning how to conduct structured analysis and design) in one-day training sessions.

The major characteristics of the asynchronous GroupWare system that was installed in the DSPW were designed in the knowledge that some officers would be unable to attend regular BPIG meetings because of external engagements. Because the DSPW is fully networked (with all officers involved in the BPIGs having computers with Lotus Notes electronic mail capability), it was a simple matter to introduce computer conferencing. Public mailboxes were assigned to each BPIG, and the different stages of their BPI meta-process were posted to them. Some of these mailboxes allowed public access, so that there could be full participation at various stages of the BPI meta-process. Public access had to be restricted in the case of certain BPIGs that were dealing with confidential information. During the training in the BPI meta-process methodology, all officers in the DSPW were trained to use the Lotus Notes GroupWare tool.

The main business processes of the DSPW were posted to the public mailboxes, providing information on the department's main activities, staff and resources, external service providers, and current student beneficiaries and scholarships. There were also postings about the business process performance, giving details of its effectiveness and efficiency, the cost drivers and the level of customer service.

Qualitative results from the use of the system

By the end of the first quarter, seven BPIGs were using the Lotus Notes GroupWare tool. The facilitator of the groups provided assistance to each BPIG by building help-support documents into the system to enable group members to remain focused on the process. The response to this user interface enhanced the media-richness of the communication. It was reported that more than 75% of all BPI interactions were conducted via the GroupWare system.

Notwithstanding the achievements of the BPIGs, the groups reported certain shortcomings with respect to the impersonality of the GroupWare system. Many group members had difficulty in communicating their ideas by means of the GroupWare medium and at times excused themselves from participating in discussions. (Against this background, it should be noted that each BPIG had a facilitator and a group leader.) The reason identified was that some members preferred face-to-face meetings and interactions. Although the leader and facilitator provided coaching and support on business process modelling, there was cultural and technophobic resistance to the non-simultaneous time and location dimensions of the interactions. Arguably, interaction in a face-to-face situation is higher, and group members were well socialised to
this form of communication. The asynchronous alternative is not only a matter of increased personal convenience, but it also allows communication to cross time and space (Sproull 1993). In some instances, asynchronous communication is able to “increase the informational and emotional connections” of peripheral employees for whom satisfying face-to-face relationships at work are not possible (Sproull & Kiesler 1991). Taking into consideration the concerns raised by members, and recognising that electronic group attributes and process may differ from those of conventional groups, the structure of the BPIGs was changed.

It was decided that members of the groups would each be given responsibility for the sub-tasks associated with particular stages of the meta-process. Members were thus easily able to share feedback by making both an initiating message and all responses visible to the entire group and by allowing a record of this information to be available for future use by new members. Since groups usually affect organisational learning by providing occasions, procedures and repositories for specialised memory, the roles and functions of the facilitator and leader became paramount, and at times overlapped. The facilitator reported that there was much improvement in process loss, and that employees’ task performance improved, especially at the meta-process stage of process analysis. The leader that continues to co-ordinate the work of the BPIGs has reported that it was technically easier to ask for and provide information in the restructured BPIGs than in conventional face-to-face meetings.

Several perceived benefits were observed, for example:

- A reduction in process loss was evident in the new BPI approach because there were no physical meeting spaces, meetings of specified time length, or constraints on the number of people that could speak simultaneously.
- Group members that had been at a disadvantage in face-to-face meetings, because they were reticent or of lower status, were empowered to contribute more equally in the new BPIG setting.
- Group members reported that their performance and effectiveness improved within and outside of the asynchronous GroupWare setting because they made use of diverse sources of information that they would otherwise have found difficult to access.
- Improved efficiency was reported in the analysis and redesign stages of the BPI exercise, and greater importance was placed on both stages.
- A reduction in superfluous and redundant improvement proposals was reported after the introduction of the new BPI approach.
- Greater use of archived information in public mailboxes allowed better identification of BPI and performance in the BP analysis.
- The speed and ease of the asynchronous communication interface in the BP analysis and design stages were perceived as value added in terms of the more rapid identification and correction of mistakes and false assumptions.
- Members of the BPIGs appeared to experience significantly more involvement in the work of the groups, and to be more satisfied with the outcomes of group proposals. It was discovered, however, that electronic communication did not simply replace the use of traditional media. Instead, the BPIGs maintained higher levels of communication in general through all channels and at all stages of the BPI approach. The transparent sharing of historical BPI and business process-related information was facilitated.

Everyone was impressed with the results obtained and posted in the BPIGs’ public mailboxes. It was reported that the system improved the relationships between senior management, desk officers and line staff in the registry. After a newspaper report, in which the DSPW was severely criticised by the ombudsman about the delay in processing applications and awarding scholarships, BPIGs were formed to explore solutions to the problem.

An explanatory model

The analysis of the problems at the DSPW suggests the building of a model regarding the use of asynchronous GroupWare to support BPI. This model is illustrated in Figure 1.

![Figure 1. Asynchronous GroupWare and business process improvement framework](image-url)

A brief description of each variable is provided, starting at the right of Figure 1 and moving leftwards:

- **BPI efficiency**: The efficiency of the BPI meta-process is a combination of the measures of the average time spent to redesign a business process, the number of BPIGs operating at a specific time and the costs involved in the BPI meta-process.
- **BPI effectiveness**: This is the average effectiveness of a business process redesign. It measures the effect that the redesigned business process has on quality and productivity.
- **BPI opportunity identification**: This variable represents both the efficiency and effectiveness of the identification of BPI opportunities. It provides cost drivers, efficiency feedback and information about similar business process improvements that may be replicated, and draws on the variable 'BPI efficiency'.
- **BP analysis**: This variable represents both the efficiency and the effectiveness of the analysis stage of BPI. Measurements are usually based on the time taken to carry out the BP analysis, and on the quality of the information generated for the next stage in the BPI meta-process, BP redesign.
- **BP redesign**: This variable usually affects both the efficiency and effectiveness of the BPI meta-process, of which it is a substantial part. A loss of efficiency in the BP redesign stage, for example, extended time and high costs, will directly impact on the efficiency of the BPI, while a poor quality redesign may reduce the effectiveness of the BPI meta-process. This relationship between the efficiency and effectiveness of the BP redesign and the BPI meta-process is posited by Davenport (1993a), Dennis et al. (1994) and Hammer & Champy (1993).
- **BPI history information access**: This is the degree of access that prospective BPIG members have to historical information about former BPIs, which usually has a positive effect on the variable 'BPI opportunity identification'.
Framework for integrating GroupWare technology and business process improvement

The GroupWare literature on evaluative studies reports gains in productivity and in the quality of the interaction processes of GroupWare systems to support communication in groups (Brothers et al. 1992; Chidambaram & Kautz 1993; Clement 1994; Nunamaker et al. 1991; Sproull & Kiesler 1991). The longitudinal property of the research with which the organisation has conducted this, especially with the introduction of the asynchronous GroupWare system. The model explores the role of GroupWare as a tool to replace or expand face-to-face communication in groups (Serida-Nishimura 1994). It also focuses on gains and losses from a group interaction point of view, with a few exceptions (Orlikowski 1992; Rein, Holtsapple & Whinston 1993). The exceptions usually disregard the impact of other functions, such as allowing public access to relevant historical and business process information within the organisation. These points are the seminal features of the model.

Limitations of the current research

The results outlined in the explanatory model may have been distorted by some sources of bias. The two main sources of bias in this research were:

1. The study was based on a single site, which may affect the generality of the research from an organisational perspective.
2. The researcher was highly involved with the organisation, conducting the research concurrently with consulting projects.

In fact, both of the sources of bias are characteristic of action research (Galliers 1992; Sommer 1994). Most action research in organisations has been performed in a small number of sites (and very often in a single one) in order to allow the researcher to gain a deep understanding of the context being studied within a relatively short period of time (Candlin & Wright 1991). Studying several sites would either delay the reporting of results or disperse the focus of the research, both of which are undesirable. The second source of bias, the high involvement of the researcher, was inevitable since it is one of the attributes that defines action research as a distinctive research approach (Francis 1991).

The first source of bias could be reduced in the current study by following one of the following two options:

1. Producing as the final result of the research a specific model explaining the relationship between asynchronous GroupWare and BPI within a specific context (for example, a type of organisation or activity)
2. Basing the investigation on units of analysis that are common to all organisations, such as business process, business process agents, BPI and BPIGs. The second option was used. It also allowed access to a considerable number of instances for each unit of analysis, which is likely to improve the significance of the results.

The researcher following two complementary protocols could also reduce the second source of bias by:

- Analysing the data in a rational way and from a disen-gaged perspective. This approach is highly dependent on the researcher's own ability to detach himself/herself from the context being studied, and on his/her lack of commitment to positive results for the organisation
- Involving a group of external researchers in the analysis of the data collected.

Recommendation for further research

This model is not exhaustive and may be enhanced and refined by further research efforts.

The qualitative nature of this study was informed by action research methodologies (Checkland 1991), although on a limited scale. However, several other research approaches could have been used to improve the characteristics of the model, for example, case research (Yin 1989) methodologies. Other effective research tools, such as survey research and experimental research methodologies, are not recommended. They are constrained by:

- The longitudinal property of the research with which the model originated, and its disparity with cross-sectional studies
- The limited number of organisations currently using asynchronous GroupWare systems to support BPI
- The orientation of the model towards the description of real organisational settings, as opposed to controlled environments.

1 A team is a permanent group that performs activities in a business process. A BPIG is typically a temporary group, the main purpose of which is to improve a business process, whether its members are involved with it daily or not.
2 The name of the organisation has been altered to protect confidentiality.
3 Considering that a group would take an average of four weeks to complete its work.
4 For example, the response to students'/clients' complaints on delays in applications for awards and scholarships was a change in the format of the application form itself, rather than any change in the way the application process was carried out.
References

Bate, J.S.J. & Travell N. 1994. GroupWare. Henley-on-Thames: Alfred Waller.


PC Week. 1991. 'Special report on GroupWare', 14 October.


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