

ERP Systems: Facilitating or Confounding factors in Corporate Telecommunications Mergers?

Duane Truex

Georgia State University, U.S.A. and
The University of Salford, England

Ojelanki K. Ngwenyama

Virginia Commonwealth University U.S.A. and
Aalborg University, Denmark

Abstract: This paper presents preliminary findings of an research project in which the research partners, academics and a telecommunication labour union, are attempting to understand, learn from and anticipate further changes related to the implementation of ERP in an industry sector in the midst of consolidation via corporate merger.

I. INTRODUCTION

This paper describes an ongoing action research project initiated to assess the impact of the introduction of an enterprise resource planning system (SAP R3) in a single Canadian telecommunications company, BCTel (British Columbia Telephone Company). In the midst of the research program it was announced BCTel would merge with another Canadian telecommunications company, TELUS, of Alberta. This development, while not surprising given predicted consolidation in the world telecom markets, is interesting given that both companies had each recently adopted SAP R3 using similar reference models and system components. The merger appeared to give further credence to the prediction that the use of common reference models and ERP systems would remove significant barriers to organizational integration and spawn industry consolidation. Thus it was expected that the integration of both companies would be relatively unproblematic with the presence of a common ERP assuring the subsequent success of the merger. While the research is ongoing and, as of this writing the jury is still out the success of the corporate merger, it appears that the presence of SAP at both organizations has, contrary to expectations, presented significant problems for each organization. One unique aspect of the project is that the research partner is the labour union representing the workers at BCTel, the Telecommunications Workers Union (TWU). As a result of the merger the TWU is itself now

engaged in a certification election against the opposing union from TELUS, the International Brotherhood of Electrical Workers (IBEW). Thus the study is occurring in a surprisingly dynamic and interesting context. Preliminary findings and lessons gleaned from working in such a dynamic research setting will be shared during the paper presentation.

II. THE RESEARCH QUESTION

At one level this research seeks to understand the structural organizational and work process changes to be faced by labour resulting from the adoption ERP systems. One expected outcome is for union leadership to structure programs enabling workers to acquire and maintain skillsets appropriate to the new work environment. A second and more difficult question is: do ERP systems, when applied in highly dynamic organizational settings, lead to greater long-term stability. This study is unusual in that the point of entry to the organization, and the action research partner providing that access, is the Telecommunications Workers Union (TWU) of British Columbia. Research partnering with labour has not figured significantly in IS research since the early 1990s. At that time one Scandinavian ISD research stream examined jointly optimized union-management systems projects following socio-technical development principles. To our knowledge no other ERP research has engaged organized labour. Canadian labor unions are unique in North American settings as they have a more protected status than do the unions in the USA. And the TWU is unique among Canadian telecommunication unions, as there is language in the collective bargaining agreement that guarantees protections when technological change might have an adverse impact on its membership. The union was

established in 1949 and has an unusual position in the telecommunications industry in that it represents bargaining units of technical personnel who are typically seen as managerial or exempt workers in most other settings. Many of these provisions, though common in Northern European collective agreements, are very unusual in North America. Hence this union has access to important data resources and the interest to engage in action research project.

A. *Current Research*

There is a large, and growing stream of research on software system implementation (e.g., IS Development methods and tools, GroupWare). And there are numerous consulting and technical reports on ERP implementation. But published research studies on ERP projects still remain relatively sparse. Most are concerned with the successful implementation of ERP and those exclusively from a management centric viewpoint [1], [2]. Many are case studies of such successful implementation which try to extract principles for success in configuration or process reengineering. [3], [4], [5]. A few studies examine the impact on workforce size or the perceived success or failure of the implementation [6], [7], [8], [9]. Studies exploring organizational change are largely descriptive reports of organizational restructuring and headcount reductions at selected SAP implementation sites [10], [11], [7]. But these all view success in a limited fashion, that is, they do not study larger aspects of organizational and institutional change coinciding with the implementation of these systems.

B. *The Importance of the Research Question*

The adoption of enterprise resource planning software (ERP) systems is one of the most important software implementation events of the past thirty years. When successfully implemented in a near majority of firms in an industry, these tools have the potential of reshaping whole industries and supporting a consolidation and concentration on an unprecedented scale. They are reshaping the way software is built and reshaping the basic social power structures in whole industries. The dominant player in the ERP market is SAP (Systeme, Anwendungen, Produkte in der Datenverarbeitung, or in English, Systems, Applications and Products for data processing). In a market with six

primary players SAP holds a 66% market share and has more than 14,500 installed sites worldwide.

1. *ERP Costs.* In the U.S. ERP sales grew from under \$1 billion in 1993 to more than \$8 billion in 1998. For an implementing company the software purchase cost is but the tip of the iceberg; total systems integration is 8-10 times the cost of the initial software price and they will typically spend 15-20% of the purchase cost annually to keep the ERP system up to date. In the US companies spent \$80 billion on integration projects alone in 1998. ERP system sales are expected to grow to at a 37% compounded rate to \$52 billion worldwide within the next five years. This growth has resulted in an estimated 50 openings for every trained ERP systems integrator with average salaries for personnel with 2 years of experience topping \$130k plus on-time completion bonuses.

Why are companies willing to incur such costs? Simply put, when implementation is successful, firms are reporting returns on investment ranging from 30-300% because ERP is business process infrastructure totally integrated in software. ERP systems are software mirror images of major organizational processes such as customer order fulfillment and manufacturing. These systems automate and integrate basic organizational processes from finance to the shop floor and eliminate complex and redundant legacy software systems that were never designed to talk to one another. When properly integrated and functional, ERP systems promise to deliver streamlined enterprise-wide business processes, information and data management. And, as ERP systems are built on 'best practice' industry reference models, they promise a reasonable degree of process competitiveness while providing the opportunity for inter-organizational collaboration and intra-organizational data sharing.

2. *Wider consequences.* An historical barrier to merger in industries heavily dependent on information technologies has been the incompatibility of organizational systems and the near impossibility to integrate incompatible enterprise data models. SAP greatly alters an industry's environmental landscape because it removes a significant barrier to integration. It becomes much easier to integrate operations of two large telecommunications companies when the workflow, process, and most importantly, the data models are the same in both organizations. We may see such consequences with the merger of the GTE-owned BCTel and Telus of Alberta. Both are SAP users. Moreover GTE and its other

subsidiary telecom organizations are SAP users. A further consolidation with the Prairie (Manitoba and Saskatchewan) phone companies is reported to be under consideration. The consolidation trend is being discussed by the professional community of ERP integrators and users under the guise of Industrial Resource Planning systems [12]. In this discourse the company is nearly irrelevant because there are no longer barriers to end-to-end data sharing.

3. *Organizational Implications.* Some implications of this development are quickly becoming apparent. For instance, these organizations have fewer technical barriers to the integration of multiple work processes that can be out-sourced to less expensive labor markets anywhere in the world. In one instance at BCTel five previously independent jobs—order taking, credit checking, repair servicing, checking of available inventory, scheduling of installation or service—can now be performed by a single worker while on the telephone and while working at a computer terminal. This employee can service any orders from anywhere in the world as long as s/he is on the system. Thus types of work become transparent to the customer and wholly virtual; i.e. unconstrained by location and removed from specific geographic, cultural, political or institutional settings. Such developments increase the potential for industrial globalization and consolidation.

Other changes may appear less apparent at first glance. For example, ERP software has an impact on the way systems are built and introduced into organizations. Whereas, in the past, the prime goal of a software development project has been to fit the shoe to the customer's foot, with ERP the customer is forced to reshape his foot to the ERP shoe. Organizations are redesigning work processes, discarding old practices organizational structures and legacy systems to fit the demands of the ERP master. Furthermore, because ERP systems allow for the capture of virtually any type of information at the point of entry, and then make it available to any process or authorized person in very powerful ways, these technical exigencies now have the potential to generate enormous social change. For instance, having data both available and useable allows for sophisticated data mining and business knowledge discovery. With its end-to-end data sharing it provides access to many powerful analytical tools and models for supply chain analysis, logistics and production planning and supports the ability to monitor organizational processes at any degree of detail a manager might like. The work of functional management specialists is now

performed in software, making much of management a virtual process. The result is an enormous concentration of power in top management. Those with access to the data are empowered. Those without access will be marginalized.

ERP requires changes in management decision structures, evaluation and measurement systems. These changes in turn affect organization authority, role responsibilities, job structures, and incentive schemes. This affects organizational culture, values, beliefs as well as modes of thinking about, and solving problems. The sheer scale and complexity of organizational and technology change suggested by SAP is unprecedented in the history of Information Technology [13].

III. METHODOLOGICAL APPROACH

A. *Data collection*

This project is an example of Action research. In May 1998 the co-researchers were invited to help the Executive Committee of the British Columbia Telecommunications Workers Union understand the nature of ERP and to summarize the experience on SAP implementation as reported in the academic literature. This led to our acquiring a complete set of documents covering the proposed system and change that had been provided by BCTel management. We were asked to provide an independent assessment, and were subsequently invited to study the transition at BCTel. Thus began an unprecedented opportunity to study an ERP implementation from the bottom-up and from within the ranks of labor. For example, we now have access to key documents and personnel and the opportunity to be participant observers in critical meetings. This affords the opportunity for participant observation in numerous union decision-making forums. In short it has provided access to the types of organizational texts and perspective that is simply not typical of implementation studies.

Our relationship with the TWU allows us to monitor and study ongoing developments in the merger. The researchers have, with study team members drawn from the union leadership, have jointly developed research protocols and structured interview questionnaires. Those are being used to conduct intensive two-hour interviews with labor and management users, and implementers of both pre-ERP and post-ERP systems. The project is consistent in classical

action research. One organizational learning goal is to train members of the TWU study team so they may conduct the ongoing interviews. All interviews are being tape-recorded. The tape recordings, field notes, and meeting minutes and drawings are being transcribed and saved for analysis. The researchers have pledged to stay with the process until a mutually determined conclusion. Interviews are expected to continue through 2000.

B. Data Analysis

The mixed character of the data requires several approaches to the analysis process. Archival documents and meeting minutes will undergo discourse and protocol analysis. Additionally, we have begun a critical deconstruction of company documents, made available to the union. Interview texts and notes will be mapped using a cognitive mapping tool, Decision Explorer, and analyzed for structural themes and patterns. These analysis techniques are now well accepted in our research community and have been successfully used in work in print, in press and under review [14], [15], [16], [17], [18].

IV. PRELIMINARY FINDINGS

As our research partner is the TWU it is not a surprise that one of the goals of the work is to learn and be able to anticipate the impact the changes wrought by SAP and the merger will have on the union workers. Knowing and ultimately predicting likely events will allow the union to frame training and bargaining responses to use in protecting and preparing its membership for a future changed by the technology. The early and exploratory interviews suggested that the SAP transition was having impact on four areas: 1) job loss and transition; 2) unanticipated organizational changes; 3) structural change in work; and 4) decision-making. While the first three topics may be self-evident the last needs a bit of explanation. The interviews we conducted suggest an altogether different view of how work is accomplished and how day-to-day decisions are made in the provision of telephone service. We were surprised to find that major decisions, often involving very significant sums, were regularly made by non-management bargaining unit (union) employees. Hence, it became a point of interest to see how the introduction of ERP and its concomitant work process reengineering would impact authority, decision making and the organization of work. Thus the four areas listed above became themes to be explored in subsequent

interviews and provided a framework for the ongoing analysis. From this material we excerpt several key points for discussion below.

A. Primary reasons for the move to ERP

The reasons given for early moves to ERP systems centered on the desire to consolidate processes and achieve competitive advantage via the 'best of practice' industry reference model available in the ERP system. From our interviews we learned that the Y2K concern became the primary argument that BCTel management used to gain support for their SAP acquisition decision. Interoperability of system components and of shared data were also strong motivators, as was the planned savings to be realized in head-count reductions. However, by early 1998 Y2K fears began driving the ERP implementation. These points are made in the following excerpt from one interview.

DT: OK, I'm very interested in this, I'm guessing as we hear themes that the Y2K was one big one.

M1: For us it would be the biggest because most of the systems that we had, some of them were 25 - 30 years old, and they were all written either in Cobol or they were written in other old machine languages that definitely were not Y2K compliant, they were all into the 2 digit

DT: So that was actually voiced as one of the primary [reasons]

M1: Absolutely, that was the selling point of SAP, because what you've got is how much money do you spend to remodify home built systems, or do you take that to modify and make it Y2K compliant, and then there's the odds and sods if you have to add to it, or do you get one that's already built that's got that large footprint that can take those various pieces of information and deal with it, maybe in a different way, and that's what happened to our business plan within BCTEL because we had to adapt within the SAP framework.

DT: Ok, Year 2K would be [reason] one, the second would be...

M1: Well, the second would be shared [data] access. And third would be more or less a continuity, so that when you put in a project number or if you put in an invoice number, ...if you put in 1,2,3,4,5 and at the far end of the system where it may be the last time you see it it's still 1,2,3,4,5

B. Impact on work force

Our early findings are consistent with other reports in the literature [5, 6], showing wholesale elimination of job classes and functions, and increasing worker stress. At BCTel the financial accounting and control functions were especially hard hit with reports of staff reductions ranging from a low of 12.55 to 100% in some departments. The norm was better than 60% job elimination. The turmoil appears to have been spread throughout the organization with departmental consolidation and other structural changes. The stress of change and of job reductions is being shared throughout rank and file and management. Those departments hit early were charitably spared the worry associated with not knowing what to expect. Interview after interview revealed that the stress of dealing with a shrinking workforce, increased workload and with having 'the Sword of Damocles hanging over one's head' was having a detrimental impact on employee morale and productivity. One manager we interviewed expresses it as follows:

M1: So I think there's going to be a huge transition, some people will be impacted only in the respect that their lives will be put in turmoil for quite awhile as they go through this. At the end of it, if it's successful and should it be successful, it has to be successful in order for the new company to be competitive, ... The business plans always state that, they say when we implement it SAP, that there was always a head count associated within [some period] of a fairly radical new process, because of the work that changed. You suddenly no longer need that support, you suddenly maybe even in the middle management side, don't need the staffing required that was there to support the various systems that were there before, I mean this is one of the sound points of SAP. Not only does it cost you \$56 million, but when you can your \$56,000 by laying off or firing 28 managers and 15 clerical, or whatever, there's an offset. ... I don't think [release]4.6 or 4.5 is going to make any more of an impact on what we've got right now.

Moreover the workload was increasing for those who did survive the cuts. And we continue to hear that the increase in workload is not necessarily offset by improved system support.

JP: [before SAP] "9 of us support 30 sales people where now 5 support 80 salesmen"

C. Implementation Issues

The implementation of SAP was unlike any other previous systems implementation at BCTel. In previous large-scale development projects management had assembled project teams of bargaining unit personnel (union members covered by the union contract), management and IS staff to be involved in the whole range of requirement identification through implementation, training and evaluation lifecycle activities. As a result interviewees reported that legacy systems were well liked and served their intended purposes very well. Moreover people reported that the process of systems-organization integration in the past had been relatively smooth and unproblematic. The SAP project stands in sharp contrast to the systems development activities of the past. In the transition to SAP R3, bargaining unit personnel were precluded from early participation. Indeed, more than 15 months of planning and preparation by management and SAP consultants had been completed before the union was informed of the intended transition to SAP. Although there is a legal requirement for management to provide adequate notice of technology change so that the union can plan for retraining and transitioning those of its affected members, they were not notified until only four months prior to the going-live date of the SAP system. The results of this management action are the subject of considerable interest and will be more fully explored in later work. However for the purposes of this paper it is important to note that management ultimately found it necessary to turn to the very persons excluded from pre-implementation activities to sort out and make the delivered system configuration viable. In the weeks following the go-live date normal work ceased. SAP as implemented in many areas was radically different from previous systems and way of thinking about the work at hand. What little training had been offered workers was of little use for two reasons. First, it simply was not very good. We had many examples of how trainers could not answer basic questions about the system use and how pieces related one to another. It soon became clear that the configuration was not up to par and that consultant and management trainers knew neither the work processes nor the system well enough. Second, the training as offered was during the workday with its normal demands and interruptions and in many cases was given long before workers had the opportunity to connect and

actually use the system. Thus the material provided in training was lost as it could not be immediately applied or because system elements had changed. The apparent corporate strategy to exclude user communities from the configuration community and to rely instead on management only had backfired. As a result in a number of instances users were left to fend for themselves and learn largely by trial and error. This had a very interesting consequence. A number of users began to master system use and some began to record the procedures they followed in so learning and using the system. As word spread in bargaining unit circles other workers began to call and email the more adept workers and ask for instructions and assistance. Eventually management learned of these people and in two instances tapped them to create 'users manuals' for general distribution on company intranets and the like. We interviewed three of these people. Management identified and recruited these persons without telling them that their particular job classes had been targeted for elimination. Once the task was completed these people were made redundant. This provides but one illustration how the SAP implementation is much more instrumental in its approach to the worker/user community and less sensitive to organizational surroundings and culture than had been past practice. As of this writing numerous subsystems remain in disarray and even so the newly merged organization is not moving to update to R4.6 and move to a common SAP footprint for the new organization.

D. Integration issues

Both BCTel and TELUS continue to face significant and traumatic transitions since the merger. For BCTel, these began with the move from well-liked legacy systems to a major SAP implementation that went live in 1998. The integration of the two companies (BCTel and TELUS) after the formal merger necessitated a consolidated SAP implementation in order to integrate the data and work processes of both organizations. To bring this about the management decided in 1999 that the BCTel organization should upgrade to SAP release 4.6 to match TELUS. The implementation is now in progress and expected completion is mid 2000.

Table 1 provides a summary of how reference modules were interpreted and used at BCTel and the mapping of modules at each organization. This points out an interesting fact. Namely, while both organizations were using SAP there were significant and unexpected differences in the

particulars of the implementation at each site. The BCTel approach was one they called the 'big footprint' where a set of modules were acquired and imposed on the organization. Business process reengineering was accomplished in concurrence with and was driven by the software. The organization remains in the midst of wrenching changes as it seeks to adapt its new processes and structures to the demands of the software. In the instance of Telus the organization configured highly customized modules which more closely matched the organizational culture and work procedures at Telus. The result for the newly merged company was additional trauma. Each company had adopted SAP. It was therefore expected that consolidation of process and data would be swift and relatively painless. But the significant differences which existed in the procedures and corporate cultures of the two companies were exacerbated by the residual of the differing cultures in the remaining legacy systems and in the customized modules and the embedded cultural assumptions of the ERP itself.

V. CONCLUSIONS

This paper reports on research in process. Indeed we expect to follow developments in these organizations for some time to come. As such, preliminary findings reported above reflect a small piece of a dynamic picture. By its very source the focus of this research differs from extant work on ERP systems research. This work has caused us to reconsider traditional views of implementation success from that of a management-centric view to one encompassing both the local narratives of workforces and communities in transition because of a software system change. It has also caused us to modify our conception of how easily ERP allows for integration of organizational data and processes and presumptions that the merger of firms using similar ERP would guarantee smooth and successful transitions. Not all SAP initiatives have been successful. Examples of limited success and outright failure [7] indicate that the means to correctly implement such software systems are not yet well understood. This research, in examining the impact on a competent and engaged professional, technical and blue-collar workforce will lead to a better understanding of the implementation process.

Table 1: SAP Modules as used at two firms:

MODULE as used	Modules in use by:	
	BCTel	TELUS
Financials (FI) (accounting) All financials, managerial and financial statements	Accts.Payable; Accts Rec'ble; Accts. Mng't; Reconciliation	A/P, A/R, A/M
Controlling(CO) (overhead cost and product cost) All operating budget by cost center and work center	Clerical	clerical
Investment Management (IM) (Capital investment) Capital structure and capital budgeting	Capital mngt.	C/M
Project System (PS) Project management planning work and resource allocation budgets and tracking plan through implementation	Networks: techs, clerks	PM, Tech, Clerks
Work Flow (WF) Way of handing off work to be done; electronic distribution; manage signoff; managerial function, do we have the \$\$ and people?	Net OPS	
HR Human resources Training completed, skill set tracking. Currently PeopleSoft provides benefit tracking and management	[PEOPLE SOFT]	
Plant Maintenance (PM) Maint. Of test equipment, truck maint., switches, ...	Tech Craft	
Sales and Dist. (SD) Salesman sells, generate warehouse picks, billing and charging, work scheduling, PBX orders	Clerks, sales, techs	
Materials Management (MM) Ordering, materials stocking at warehouse, pick tickets (Catalyst used at BCTel)	[Catalyst] plant, drivers, clerks, buyers	

ACKNOWLEDGEMENTS

This work was partially supported by the Georgia State University Robinson College of Business research course release program, the Canadian NAAL (New Approaches to Lifelong Learning foundation) and by the TWU (Telecommunications Workers Union) of British Columbia.

REFERENCES

[1] S. M. Glover, D. F. Prawitt, and M. B. Romney, "Implementing ERP," *Internal Auditor*, vol. 56, pp. 40-46, 1999.

[2] B. Bond, K. Pond, and T. Berg, "ERP Scenario," Gartner Research and Advisory Service, Strategic Analysis Report June 21 1999.

[3] J. Harris, "Designing change management strategies for ERP systems: observations from Alameda County, California," *Government Finance Review*, vol. 15, pp. 29-31, 1999.

[4] K. Ripper and M. J. Durham, "Phased ERP implementation: the City of Des Moines experience," *Government Finance Review*, vol. 15, pp. 37-43, 1999.

[5] G. Jacob and T. Wagner, "Rapid ERP Implementation: the Tuolumne County, California experience," *Government Finance Review*, vol. 15, pp. 33-38, 1999

[6] M. A. Larsen and M. D. Myers, "BPR Success or Failure? A Business Process Reengineering Project in The Financial Services Industry," presented at ECIS 1999, Aix-en-Provence, France, 1998.

[7] Davenport, T. (1998). Putting the Enterprise into the Enterprise System. *Harvard Business Review*(July), 121-133.

[8] Sawyer, S. (1998). Multi-Method Research and Organizational Computing Infrastructures. *under review*.

[9] Sawyer, S., & Southwick, R. (1997). Transitioning to Client/Server: Using a Temporal Framework to Study Organizational Change. In A. Lee, J. Liebenau, & J. DeGross (Eds.), *Research on Qualitative Methods in Information Systems* (pp. 343-361). New York: Chapman-Hall.

[10] B. Bashein, L. Markus, and J. Finley, "Safety Nets: Secrets of Effective Technology Controls," The Financial Executives Research Foundation, Morristown, N.J. 1997.

[11] Davenport, T. (1996). *Holistic Management of Megapackage Change: The Case of SAP*. Paper presented at the Third Americas Conference in the Americas, Phoenix, Arizona.

[12] Fingar, P. (1999). Enterprise Architecture for Open Ecommerce. *Component Strategies*(February), 44-48.

[13] Ngwenyama, O. (1998). Enterprise Resource Planning and SAP: an occasion for organizational change?, *Technology Change and Contracting Out Joint committees of the TWU and BCTel* . Vancouver, British Columbia.

[14] Beath, C. M., & Orlikowski, W. J. (1994). The Contradictory Structure of Systems Development Methodologies: Deconstructing the IS-User relationship in *Information Engineering. Informations Systems Research*, 5:4(December 1994), 350-377.

[15] Truex, D., & Baskerville, R. (1998). Deep Structure or Emergence Theory: Contrasting Theoretical Foundations for Information Systems Development. *Information Systems Journal*, 8(2 April), 99-118.

[16] Truex, D. P., Baskerville, R., & Klein, H. K. (1999a). Growing Systems in an Emergent Organization. *Communications of the ACM*, in press.

[17] Truex, D. P., Baskerville, R., & Travis, J. (1999b). Amethodical Systems Development: The Deferred Meaning of Systems Development Methods. *Accounting Management and Information Technology*, in press.

[18] Truex, D. P., & Ngwenyama, O. K. (1998). *Unpacking the Ideology of Postindustrial Team-Based Management: Self-governing Teams as Structures of Control of IT Workers.*, Work, Difference and Social Change: Two Decades after' Bravermans's Labor and Monopoly Capital, Binghamton, New York.