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THE IMPACT OF ORGANIZATIONAL SUB-CULTURES ON THE IMPLEMENTATION OF COMPONENT-BASED DEVELOPMENT: A CASE STUDY OF AN INTERNATIONAL INVESTMENT BANK

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ABSTRACT

This paper presents a case study of the investment banking arm of a multinational banking corporation (Invebank) which is attempting to introduce Component-Based Development (CBD). Problems were apparent in this adoption because, while CBD requires extensive knowledge sharing and collaboration, sub-cultural differences between groups within Invebank meant that this proved difficult to enact. Thus, the paper considers the complexities of sub-cultural differences in firms and provides a salutary reminder that the implementation of so-called corporate-wide integrative 'solutions' such as Business Process Reengineering (BPR) and Enterprise Resource Planning (ERP) systems, as well as CBD, cannot, automatically, bear fruit in terms of firm performance. Further, the paper highlights the point that there is more to the issue of organizational sub-cultural differences than the oft-cited business-IT divide. The more simplistic entreaties to knowledge sharing and the nurture of collaborative cultures and consensus are also brought into question.

Key words: Organizational culture; organizational sub-cultures; component-based development; knowledge sharing; interpretive research; case study research.

1. INTRODUCTION AND THEORETICAL FOUNDATIONS

Attempting to achieve organizational renewal through IT innovation is increasingly popular. This is evidenced, for example, by the large number of organizations, which have undertaken Business Process Reengineering (BPR) (Hammer and Champy, 1993), and more recently, the growing number that have adopted corporate-wide integrative solutions, such as Enterprise Resource Planning (ERP) systems (CACM, 2000) and Component-Based Development (CBD) (Grundy *et al*., 2000). All such initiatives are based on the premise that they will drive strategically important organizational change. We argue that such initiatives should not simply be seen as IT innovations, which can be dealt with in isolation. Rather, there is a need to develop an organizational context where a synergy can be created through the integration of IT strategizing within the organization (Powell and Dent-Micallef, 1997).

In terms of this organizational context, some researchers conceptualizes it as organizational climate (e.g., Schneider *et al*., 1996), while others prefer the label organizational culture (e.g., Harrington and Ruppel, 1999). In this paper we use the term organizational culture. Organizational culture has been shown to influence the process of how new technology is adopted, embedded and institutionalized within the hosting organization. For instance, Davenport (1994) and Powell and Dent-Micallef (1997) both depict the need for an information culture that is open, flexible and expansive in order to leverage the implementation of new technology. Similarly, Ruppel and Harrington (2001) and El Sawy *et al*. (2001), argue for the need to develop a culture that encourages the development of trust and knowledge sharing.

However, in the literature on organizational culture, many now highlight the importance of sub-cultural differences, and downplay the existence of a single, unifying organizational culture. These authors highlight the reasons for differentiating between sub-culture and culture. For example, Blackler (1995) and Sackmann (1992) both suggest that sub-cultural differences exist because of differences between tasks, expertise and activities performed by various organizational groups. Given these differences, they argue, an organizational culture cannot simply be perceived as an aggregation of various sub-cultures. There is nothing common, necessarily, between these sub-cultures that can be said to be universally applicable to the entire organization. Tajfel and Turner (1985) suggest that sub-culture represents a distinctive set of shared values, mindsets and norms that reflects a group's social identity. As Schein (1996) indicates, this divides an organization into various informal groups with invisible boundaries. De Long and Fahey (2000) explore sub-culture differences as an outcome of paradigmatic diversity between organizational members. This, they argue, often leads to the creation of barriers that inhibit cross-functional collaboration and the implementation of corporate-wide initiatives. These accounts, then, not only highlight the distinctive characteristics and significance of sub-culture, but also suggest the need to take into account the dynamics of sub-cultural differences when exploring the process of IT adoption within an organizational context Yet, our understanding of how organizational sub-culture inter-plays with the process of technology development remains very limited, with few studies specifically addressing this issue (Hauser, 1998).

The objective of this paper, then, is to explore how sub-cultural differences within an organization influence the adoption of IT. The particular IT here is Component-Based Development (CBD), as adopted in a case company - Invebank. CBD has been presented as a revolutionary approach capable of breaking down the traditional technology-engineering life cycle to speed up the process of technology development, in particular in software engineering. Instead of developing a new technology following the conventional end-to-end path, the CBD approach reuses and assembles existing components to create a new system within an "evolvable environment" (alternatively called component-based architecture), where new solutions can be effectively added on (Grundy *et al*., 2000). However, CBD is not a panacea to cure all IT development problems. For instance, Bosch (1999) reports that reusable components often require substantial modification to meet system requirements, in particular when business objectives differ from the objective for which those components were originally developed. More importantly, from the point of view of this paper, Kunda and Brooks (2000) argue that the human and social issues related to the introduction of CBD are typically overlooked as a result of an overemphasis on the technological benefits of CBD. Their study suggests that the introduction of CBD is a socio-technical challenge where group and organizational dynamics and technological advancement continuously and mutually shape and reshape each other. Despite the fact that Kunda and Brooks' study has surfaced the importance of social considerations and has briefly addressed the influence of organizational culture on the introduction of CBD, however, the significance of sub-cultural differences remains undeveloped, both in relation to this specific technology and more generally. This paper aims to rectify this state of affairs and is structured as follows. We first turn to epistemological issues associated with this case study by describing the research methodology followed. Next, we highlight the major findings before drawing conclusions from the case in relation to extant theory.

2. RESEARCH METHODOLOGY

Guided by the focus of examining the influence of subcultural differences on CBD implementation, the research described in this paper adopts an interpretive approach. The strengths of the interpretive paradigm in IS research have been reported in a number of studies, notably Klein and Myers (1999) and Walsham (1993). The appropriateness of adopting an interpretive approach is reflected in the need for investigating the implemented technology, in this case CBD, and taking into account the broader organizational context, in various particular subcultures. For example, in the words of Walsham (1993; 4-5), interpretive research methods are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context". Further explanation provided by Klein and Myers (1999; 69) states that interpretive research "attempts to understand phenomena through the meanings that people assign to them".

The data collection process was undertaken during the period April 1999 to March 2001. The research started with two months of on-site observation enabling familiarization with the social setting and fostering a better understanding of the background of the case company, including its structure, sub-cultures and business processes. This initial investigation helped make sense of the intertwined dynamics of organizational sub-cultures and CBD. Following this initial phase, sixteen semi-structured interviews were conducted during the first six months of study, followed by a second round, during which eleven staff members were interviewed. This took place in the period February to August 2000, with a third round of eight interviews during September 2000 and March 2001. Each lasted 90 minutes on average. In conjunction with these semi-structured interviews, informal interviews via telephone and email were conducted in order to reach interviewees who were geographically dispersed. All interviews, including those via telephone, were tape recorded and transcribed. Each interview transcription was shown to the interviewees to ensure validity, and used as a reference point for additional telephone and email discussion. Additional data were collected from company documentation, including letters, written reports, administrative documents, newspapers and company archives. Further information was also gleaned from the company Intranet site.

Data collected from the various sources were analyzed based on the coding techniques proposed by Miles and Huberman (1994) and Strauss and Corbin (1990). Despite the fact that the purpose of this research was not geared towards theory generation, the open coding technique proposed by Strauss and Corbin was found to be useful, in particular to generate categories and concepts that were further used to compare with the current literature. Various conceptually clustered matrices (Miles and Huberman, 1994) were developed to display evidence based on the key themes, according to the four sources of evidence. Also, this technique was employed to generate conceptual similarities and differences between the research themes.

3. CASE FINDINGS

3.1. Case Background

Restructured in 1997, Invebank, the investment banking arm of a multinational banking corporation, provides a range of financial products, including foreign exchange, currency options and interest rate derivatives. Operating in major financial centers, including London, New York, Tokyo and Hong Kong, a total of 1,500 employees generated more than $2 billion gross profits in 2000, an increase of 6% compared to 1999. A large number of new staff with various skills, accounting for more than 40% of the total workforce, were recruited after 1997, mainly on a contractual basis (33% of total employees), to fulfill growing demand.

The procedure by which each transaction is made provides a means of understanding how Invebank operates. Three business functions are accountable for different stages of the transaction, namely front,

back and middle offices. The front office is in charge of buying and selling financial products for clients, the back office settles the payment and the middle office is responsible for tracing and checking the match between trading and settlement. Each office has two main groups - business and technology - and each group is divided into various teams based on the specific range of products in which they specialize. Thus, in addition to the central supporting functions (such as Human Resources, Accounting, and Research), members of Invebank staff are organized as a matrix.

The investment banking sector exists within an increasingly turbulent environment. Many firms, including Invebank, have responded to this environment by attempting to become increasingly innovative. Indeed, 'continuous innovation' was seen by senior management as a key requirement, in terms of both product and technological innovation. The product innovation emphasis was on the combination and modification of existing products. In terms of technological innovation, there was a perceived need for the continuous advancement of technology as a means of supporting and managing the trading and settlement processes. Managers recognized that innovation across these two areas also needed to be aligned since new financial products could not be traded unless supporting technologies were in place. In particular, the growing popularity of combining Internet-based trading with conventional modes of trading (e.g., telephone) requires an integrative backbone system that can effectively facilitate different modes of trading and handle various sources of trading traffic simultaneously. The interdependence of product and technology suggests that the firm's overall innovation capability can only derive from the simultaneous development of both the business and technology functions.

3.2 The Adoption of CBD: Motivation, Needs and Advantages

Various initiatives were introduced in Invebank during the 1997 restructuring. CBD was the key initiative in relation to technological development. CBD was presented as a means by which Invebank would gain technological leadership within its sector. Specifically, the goals were: (i) to build a flexible IT infrastructure, (ii) to shorten development time, and (iii) to reduce the cost of technology development by reusing existing components. The following quote from a senior manager epitomizes the rationale for introducing CBD as a means of improving the efficiency of technological development: "*Because the industry is moving so fast you need to be light on your feet and ready to implement new parts quickly … you need to put a technical infrastructure in place such that you can implement new things correctly. And we have developed such an interface such a technical structure over the last year or so (with CBD). That allows us to do things quite quickly*."

In addition to the above advantages, CBD was also promoted as a technology development approach, which would enable the engagement of end-users in the development process. As one of the technologists explained: "*It gives you the binding of the users since they're actually involved in the development of the program. It's a bit like prototyping. You can ask the users how they like it and you can quickly move components around from there to there, or change screen colors and so on*." This aspect of CBD was seen to be particularly important within Invebank because it allowed them, potentially at least, to effectively manage technological development even in business areas where the user base is small and geographically dispersed. As one of the directors noted: "*We have an architecture whereby we can provide say a functionality to a program but only one user in the world can see that. We have the capability to give them sole access to play around with it and see how they like it…. We can therefore make new functionality available to New York or Hong Kong, even if we're not here*."

These advantages of CBD were used as the justification for adopting the approach, even though the initial costs of setting up the component-based infrastructure and of developing reusable components was higher than would have been the cost of upgrading and modifying existing systems. For instance, an internal report in 1999 stated that capital investment required for CBD had exceeded 1998's annual technology development budget by 240%. However, this was seen to be a short-term problem since senior directors expected that the running costs would be drastically reduced once the inventory of

reusable components gradually increased. In reality, however, the anticipated advantages and efficiencies to be gained from the adoption of CBD were not all achieved. During a lunch break with a front office business director in early 2000, he expressed the view that Invebank was "*continuing to throw money into a big black hole*". He continued by saying that Invebank could only benefit from its investment when a critical mass of the inventory of reusable components had been developed and it was not clear when this might happen. This paper provides some explanation as to why Invebank failed to leverage the full potential of CBD.

3.3 Difficulties in Leveraging the Potential of CBD

Interviewees suggested that a key difficulty had been simply managing the transformation involved in changing from the existing technology architecture and operating systems to a component-based interface. The technological and operational difficulties of this change were summarized by one of the managers by using a driving metaphor. He explained that it was like driving a car very fast on the motorway on a rainy day, while at the same time you are trying to change the fuel from gasoline to electricity. Notwithstanding, even though the operational and technological difficulties appeared to be substantial, interviewees commonly indicated that the main impediments related to human issues, as considered below.

Firstly, considerable end-user and technologist resistance to CBD was experienced. One reason for the end-user resistance was that they had been provided with very little training: "*One of the main obstacles is that our user bases are nowhere near as computer literate as they should be. So that's a fundamental issue with this organization. It will get better, but where's the training budget? People come to me and expect me to train them about the systems that we've got. I could do that, but do you want me doing that or do you want me building technology solutions?* (Global Head of Technology). Technologists appeared to be resisting the introduction of CBD because they perceived it as a threat. They believed that once the critical mass of CBD inventory of reusable components has been developed the requirement for expert technologist would be reduced.

Secondly, interviewees highlighted the problem of a lack of collaboration. The essence of CBD is that components are reusable, but this reusability could only be achieved in Invebank if information about these components was shared across the entire Technology Division, including teams in the front, middle and back offices. Moreover, the growing number of cross-category products demanded cross-category solutions to support trading. For instance, a new product with the attributes of interest rate derivatives and foreign exchange (two separate product categories) would require technologists working in the two product categories to form a joint team to develop a solution which could support both the trading and settlement processes. However, in the past each group of technologists had worked on technologies to support a single product category. As the General Manager explained: "*We have a large number of groups which do not want to share information, and do not want to build systems in a way that is component-based, because they believe that their value is so rich because of the environment that they have got. And they see things that run across products as a threat to their position and their stance.*" Similarly, one of the front office technology managers recalled: "*I mean, interaction between developments is minimal. It's on a need to know, requirement basis, so if there are requirements from other systems on our systems then we get involved. Why? Because I guess we're such a small team we just don't have the time, actual leisure time to sit and converse ideas with other teams. We don't have that luxury.*"

Information sharing and collaboration was thus problematic and uncommon within Invebank. This was partly due to the reality of organizational silos that were themselves stimulated by the product-based matrix structure. A number of the interviewees described the difficulties of collaboration, providing a number of explanations for this. For example, one of the technologists suggested that internal politics was the central issue: "*I guess it is all about politics in the bank. You've got to go through a lot of hoops to get anything done, a lot of sign-offs, a lot of bureaucracy …. For us to actually be at the forefront of technology, at the cutting edge, we have to constantly break those*

politics." One of the senior front office directors saw it as a manifestation of the ongoing conflict between the front and back office personnel: "*I have been in a job two months and I thought there might be loads of people in the back office who might be affected by what I was going to do. I phoned the guy who is the head of technology down there. He got all his people around a table and I brought in my presentation and my two project managers. We turned up, they turned up fifteen minutes late. Then, they said we had ten minutes before they had to go to another meeting. So I started talking and they argued with me about some of the things I said - the argument lasted nine minutes, they left and that was it. So I thought that was it. I went all the way down to the back office to communicate with them and they give me ten minutes of their time. So I don't bother now ... I am not sure they want to be communicated to really.*"

3.4 Organizational Culture and Sub-culture

To focus more specifically on these problems of resistance and lack of collaboration, in this section we consider these problems in relation to organizational culture and sub-culture, given the significance of a collaborative culture that has been stressed in the literature reviewed earlier. Indeed, within Invebank, managers emphasized the importance of cultivating such a collaborative culture to ensure the success of CBD. For example, the General Manager stated: "*At the moment, we are trying to address this precise issue (of culture), because it's like having a Concorde running on one engine. The reason to develop a collaborative culture isn't just around people who will enjoy coming to work, but also to educate our people about the value of sharing knowledge with others. If you share information, the culture will move twice the pace it's moving today. If you break down those barriers where everybody thinks they're right, you'll move three times as fast.*"

Despite this awareness that they lacked a collaborative culture, there was little evidence that this was changing. Indeed, there was no consensus about what the organizational culture was. Some interviewees suggested that an Invebank culture did not exist: "*I don't think we have got one*", "*it does not exist*", and "*it is not yet formed*". Other interviewees, all from the front office, described it as a "*fast moving culture*". Others indicated that Invebank had an "*unforgiving culture*". As one manager indicated: "*whatever you did in the past is forgotten, but if you make a mistake today, you're out.*"

There was considerable consensus amongst interviewees, however, about "cultural" differences between different functions and groups. Here then, we use the term "sub-culture" to indicate a set of norms, beliefs, values and practices shared by a group of organizational members that is distinctive from the norms, beliefs, values and practices of other groups within the organization. In the following discussion, we outline what appeared to be the main sub-cultural differences identified in Invebank and the impact of sub-cultural differences on the development of CBD.

The main sub-cultural differences appeared to be derived from the fact that different tasks were performed by different groups. In particular, the difference in tasks performed by individuals within the front and back office were marked. These differences were not only reflected in their different business objectives, but also the different mind-sets evident in each office. For instance, the front office, where all trading takes place, relies heavily on traders' expertise, efficiency and willingness to take risks. Conversely, accuracy appeared to be the major concern of the back office to ensure that payments are settled correctly to avoid any penalty. There was also a difference in the type of person in these two offices, with traders in the front office tending to be much younger than those in the back office. The gulf between these two groups is illustrated in the quote below from a front office manager, when describing those in the back office: "*Some pockets are very old-fashioned like in the 1960s - dinosaurs - unresponsive to change and always done it this way (sic.). 'I have been in this job twenty-five years and will retire in five years. Why do I want to change?' 'This computer will never work.' 'Plod on with pen and paper' - all that sort of stuff. These individuals themselves I don't have an issue with because they have always been like that. It is hard to teach an old dog new tricks. It's true. These guys have never seen a PC and never used a PC and we are coming along with a trading system and you've got to teach them how to use the PC first. You deal with them differently than you*

would deal with a derivatives trader who's 27 and been using a PC since he was eight. There's a different way of doing it."

There was also a clear sub-cultural divide between those in the business function and those in technology. As one senior manager indicated, sub-cultural differences between members of staff in technology and business had created an obstacle in forming a shared view about the value of CBD and the need for continuous investment, vital for optimizing CBD capacity: "*People in the business environment tend to think that technology is 'toys for boys' and they just want to play. It's hard for us technologists to educate them and communicate with them, so that they can understand the value of CBD and understand what we've done well and that we need more money to do even better*."

This difference between the business and technology functions was exacerbated by the fact that many of those in the technology department were contractors while most of those in the business function were permanent staff. The extent of this difference is illustrated by the fact that some permanent staff did not consider contractors as part of Invebank, and argued that they should not receive additional benefits from the firm. In the words of the Global Head of Human Resources, contractors are "*mercenary*", therefore it was Invebank's policy not to provide any training to the contractors, simply because it was their responsibility to ensure their own market value. As one of the managers argued: "*they take the money, they take the chance*". On the other hand, contractors argued that they brought in valuable expertise to Invebank, and did not feel that they received fair treatment in return. One contractor was interviewed three months after leaving the bank and complained that often his line manager had had unreasonable expectations of him. As he explained, even though some systems were developed in-house, it was very difficult to obtain adequate information and training about them. He also indicated that, during his 18 month contract, it had been very unpleasant to be involved in the CBD initiative, particularly due to poor relationships with permanent staff.

Sub-cultural differences between individuals working for different product categories were also evident, particularly in the front office. In informal conversations with the front office interviewees, it was explained that each individual's income consisted of two elements: the basic salary and a performance-based bonus. As some product categories were generally more profitable than others (e.g., currency options), front office staff, both traders and technologists, could have very different income levels. According to the front office technology manager, even though an individual's income had never been the subject of open discussion, stereotypical stories and jokes, which directly or indirectly depicted individual's income based on product category, spread quickly around the trading floor. For instance, he argued that his team regularly frequented London's up-market restaurants, such as The Ivy and OXO Tower, while other teams "*tended to hang out a lot in Chinatown*". He added that most members of his team had a SW post code (referring to up-market residential areas of London such as Kensington and Chelsea), while others could only afford to live in the suburbs or more down-market locations. Conversely, some interviewees expressed their unpleasant experiences in dealing with their "*up-market*" colleagues. For instance, one front office technologist complained that it was very annoying when other technologists from different product categories bombarded him with continuous references to their new sports cars or designer label suits.

To sum up, sub-cultural differences were clearly evident in Invebank and were a source of inter-group tension and conflict. These tensions and conflicts were reflected in the low level of information sharing and collaboration not only between Business Units and between the technology and business divisions, but also between teams working for different product categories in the same division. Given these very distinctive sub-cultures, the development of CBD, which requires high levels of collaboration and trust, was hampered. These sub-cultural differences appeared to have their origin in both groups and individuals, notably different task requirements, different abilities to control resources, and differences in the length and nature of employment.

4. DISCUSSION

Within Invebank, the implementation of CBD has not achieved all the expected benefits, at least not to-date. Management is aware of some of the problems, especially in relation to the lack of a collaborative culture, but has not managed to overcome them. In this discussion we focus on the characteristics of CBD, the relationship between CBD and organizational change, and the management of sub-cultural differences.

In terms of the characteristics of CBD, what Invebank has been implementing and continuously building is a component-based infrastructure, an inventory of reusable components and an innovation system, all of which are jointly expected to fundamentally transform the way in which software is engineered. Therefore, instead of considering CBD as a technology per se, it is more appropriate to view it is a philosophy, which Invebank aimed to embed into its technology development mindset, value and practice. Also, CBD characterizes a distinctive pattern of technology innovation, which demands an effective integration of centralized planning and decentralized development. In terms of the need for a centralized approach (Ward and Griffiths, 1996), CBD requires the establishment of a common infrastructure, the development of reusable components, and coordination between various functions and technology teams to support and fulfill business objectives. Together this will help to ensure the availability of resources vital for the ongoing development of CBD. At the same time, in terms of its decentralized attributes (Ciborra *et al*., 2000), CBD requires various technology teams working on each product category to continuously develop product specific applications, and to collaborate when a technological solution for a new cross-category product necessitates reusable components from different teams. Hence, the inventory of reusable components can be increased over time and the cost of development can be reduced.

This means that CBD requires substantial organizational change (cf., Galliers, 2001). In particular, CBD requires a high degree of cross-team collaboration. A shared understanding of required components needs to be developed between teams who possess product-specific knowledge. In particular there is a need for collaboration between technologists and end-users, to ensure that the development of a specific solution can effectively align with the requirements of the business objectives. However, as seen, there is also a need for collaboration between end-users. Yet these end-users themselves are far from being a homogeneous group. In Invebank, there were clear differences, for example, between end-users in the front and back offices, and also between users working on different product groups. In this paper, we have addressed these differences in terms of different sub-cultures and have highlighted the need to anticipate, recognize and manage sub-cultural differences.

As seen, there is some recognition of the importance of sub-cultural differences in the literature on technological development. In particular, many writers have pointed out that problems often occur because of the different mind-sets and orientations (i.e. different sub-cultures) between those working in IT and those in business functions (e.g., Feeny and Willcocks, 1999). However, in this paper, we have demonstrated that these sub-cultural differences are much more pervasive than simply a business-IT divide. In addition, key differences exist between various business functions. The existence of these multiple business sub-cultures means that it is not helpful to talk about ‘end-users’ or ‘technologists’ as if they were both from homogenous groups. In particular, where a technology is developed by different teams of technologists, and used by end-users who are located in functions with very different sub-cultures, the problem is not simply an IT *versus* business issue, as is commonly described (Grindley, 1995). Rather, the problems occur *within* as well as *between* the technologists and business people themselves. Collaboration between the technologists and between the end-users can be just as problematic as between technologists and end-users.

Drawing on the management literature, viewpoints related to the value and effect of sub-cultural differences are diverse and contradictory. On the one hand, sub-cultural differences are perceived as a key source of creativity in some innovation studies (e.g., Ford and Randolph, 1992). On the other

hand, communication efficiency can be significantly compromised by sub-cultural differences, simply because of the lack of common knowledge (Demsetz, 1991) and misperception resulting in paradigmatic diversity (Schein, 1996). Nevertheless, in relation to the adoption of integrating technologies such as CBD (but also including such technologies as BPR and ERP), a key message from the literature is that there is a need to overcome the more negative aspects of sub-cultural *diversity*. The key would appear to be to retain diversity while developing what might be described as sub-cultural *collaboration*. For example, Davenport (1994) discusses the importance of an open information culture, while Ruppel and Harrington (2001) and El Sawy *et al*. (2001) argue for a culture that encourages trust and knowledge sharing.

Drawing on this literature then, and simply applying it to the Invebank case, we might argue that the solution might have been to develop a collaborative organizational culture. However, we believe that this is naïve, since it over-simplifies the cultural concept in relation to the sub-cultural complexities of organizations like Invebank. We have attempted to demonstrate that there is no single organizational culture in Invebank, but rather multiple sub-cultures, each with their own values, norms and practices. These different sub-cultures exist because different groups have different tasks to fulfill; these different tasks place very different demands on the individuals involved and often require different orientations, approaches and outlooks (Blackler, 1995). To dismiss these different cultures as the mere vagaries of history, which can - and should - be relatively simply over-turned so that individuals come to share a consensus view, underestimates, misunderstands and misrepresents the different current realities and imperatives faced by different groups.

In terms of solutions, much of the literature is not merely simplistic but is also often silent as to how to actually achieve the 'open' and 'collaborative' culture often called-for. Where this issue is addressed, the key is usually to create some knowledge redundancy (Nonaka, 1994) so that those in the different functions learn something about the work and activities of those involved in other functions or groups. This will then allow them to appreciate the needs of others so that information sharing can occur. For example, in relation to the literature on technology adoption, Earl and Skyrme (1992) argue that the solution to the problem of sub-cultural differences between technologists and business people is to create 'hybrids' – technologists with business knowledge and business people with technology knowledge. While this 'solution' clearly has some merit, the degree and complexity of sub-cultural differences in organizations like Invebank suggests that this solution would be rather expensive and certainly not easily achievable in the short-term. Indeed, the very feasibility of the 'hybrid' solution has been called into question in view of this (cf., Currie and Glover, 1999). Perhaps a better approach, in the short-term at least, is to accept these sub-cultural differences as barriers to effective collaboration across teams and functions and to work round them by forming teams working on particular modules, designed to knit together to form a coherent whole. Emphasis would thus be placed on ensuring 'boundary spanning' activities and communication. Nothwithstanding, the purpose of this paper has not been to present generalizable solutions to this issue of contrasting sub-cultures, but to awaken interest into the complexities of the development and implementation of so-called corporate-wide integrative technologies such as CBD. To be forewarned is to be forearmed.

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