
Available from Deakin Research Online:

http://hdl.handle.net/10536/DRO/DU:30000596

Every reasonable effort has been made to ensure that permission has been obtained for items included in Deakin Research Online. If you believe that your rights have been infringed by this repository, please contact drosupport@deakin.edu.au

Copyright : 2003, Idea Group Publishing
Chapter VI

Analysis of Cultural Conflict in the Development of Web-Enabled Information Systems

Pradipta K. Sarkar and Jacob L. Cybulski
Deakin University, Australia

ABSTRACT

Web-enabled applications are used increasingly to facilitate business transactions between and within organisations. Designing a successful web-based information system requires considerable insight into collaborating organisations, their technological needs, having the substantial management and development experience, and a thorough knowledge and understanding of the cultural issues arising from the diverse base of stakeholders involved in the development, implementation, and the usage of the system. Cultural differences in particular, often ignored in information systems development, if not addressed appropriately, may lead to impaired communication, misunderstood requirements, flawed decisions, and ultimately conflict among various stakeholder groups. In this paper, we propose a method of identifying cultural issues early in the development process and we do so by focussing on stakeholder concerns, commonly perceived as a barrier to effective development process, but which we find a useful instrument in studying cultural divergence and in some cases also conflict.
INTRODUCTION

The advent of the World Wide Web (WWW) and the emergence of Internet commerce have given rise to the web as a medium of information exchange. In recent years, the phenomenon has affected the realm of transaction processing systems, as organizations are moving from designing web pages for marketing purposes, to web-based applications that support business-to-business (WEB) and business-to-consumer (B2C) interactions, integrated with databases and other back-end systems (Isakowitz, Bieber, et al., 1998). Furthermore, web-enabled applications are increasingly being used to facilitate transactions even between various business units within a single enterprise. Examples of some of the more popular web-enabled applications in use today include airline reservation systems, internet banking, student enrollment systems in universities, and Human Resource (HR) and payroll systems.

The prime motive behind the adoption of web-enabled applications are productivity gains due to reduced processing time, decrease in the usage of paper-based documentation and conventional modes of communication (such as letters, fax, or telephone), and improved quality of services to clients. Indeed, web-based solutions are commonly referred to as customer-centric (Li, 2000), which means that they provide user interfaces that do not necessitate high level of computer proficiency. Thus, organizations implement such systems to streamline routine transactions and gain strategic benefits in the process (Nambisan & Wang, 1999), though the latter are to be expected in the long-term.

Notwithstanding the benefits of web technology adoption, the web has ample share of challenges for initiators and developers. Many of these challenges are associated with the unique nature of web-enabled applications. Research in the area of web-enabled information systems has revealed several differences with traditional applications. These differences exist with regards to system development methodology, stakeholder involvement, tasks, and technology (Nazareth, 1998). According to Fraternali (1999), web applications are commonly developed using an evolutionary prototyping approach, whereby the simplified version of the application is deployed as a pilot first, in order to gather user feedback. Thus, web-enabled application typically undergo continuous refinement and evolution (Ginige, 1998; Nazareth, 1998; Siau, 1998; Standing, 2001). Prototype-based development also leads web-enabled information systems to have much shorter development life cycles, but which, unlike traditional applications, are regrettably developed in a rather ad hoc fashion (Carstensen & Vogelsang, 2001).

However, the principal difference between the two kinds of applications lies in the broad and diverse group of stakeholders associated with web-based information systems (Gordijn, Akkermans, et al., 2000; Russo, 2000; Earl & Khan,
2001; Carter, 2002; Hasselbring, 2002; Standing, 2002; Stevens & Timbrell, 2002). Stakeholders, or organizational members participating in a common business process (Freeman, 1984), vary in their computer competency, business knowledge, language and culture. This diversity is capable of causing conflict between different stakeholder groups with regards to the establishment of system requirements (Pouloudi & Whitley, 1997; Stevens & Timbrell, 2002). Since, web-based systems transcend organizational, departmental, and even national boundaries, the issue of culture poses a significant challenge to the web systems’ initiators and developers (Miles & Snow, 1992; Kumar & van Dissel, 1996; Pouloudi & Whitley, 1996; Li & Williams, 1999).

In this paper, we propose a method of identifying cultural issues that could lead to situations of conflict in the development of web-enabled applications. We focus on conflict that results from differences in organizational and departmental culture. Discussion of conflict in general and from the perspective of cultural differences is the subject of the next section.

THE CONFLICT OF CULTURES

Organizational conflict and its pervasive nature can be observed in any organization (Schermersmorn Jr., Hunt, et al., 1997). Conflict of such nature may occur at personal, group, and organizational levels, and its manifestation could take the form of intra-personal conflict, inter-personal conflict, intra-group conflict, inter-group conflict, intra-organizational conflict, and inter-organizational conflict. Business stakeholders may disagree on matters such as the setting of a group, organizational goals and values, allocation of resources, distribution of rewards, policies, procedures, and task assignments (Putnam & Poole, 1987). In extreme situations, unless it is detected early and dealt with promptly, intra-organizational conflict could lead to express struggle between stakeholders who have incompatible goals, who share scarce resources and compete for few rewards, and who are the source of mutual interference (Hocker & Wilmot, 1985). Some practitioners, nevertheless, consider conflict as an intrinsic part of organizational life and, if properly managed, an instrument of growth and desired change (Deutsch, 1973; Robbins, 1974; Renwick, 1975).

Conflicts commonly develop over an extended period of time, and they follow a number of easily recognizable stages (Pondy, 1967), i.e. latent accumulation of conflict antecedents, feeling or perception of early signs of conflict, manifestation of conflicting behavior, and the conflict aftermath upon its suppression or resolution. Since conflict antecedents are directly responsible for the development of manifest conflict, the focus of our study is directed towards gaining better understanding of
these conflict-conducive conditions, of which there exist three main types, i.e., socio-political, structural and technological (Kumar & van Dissel, 1996; Li & Williams, 1999).

Socio-political antecedents frequently relate to the issues of mutual trust among participant firms in the sharing of sensitive business information and the control of information resources in the inter-organizational network. Opportunistic behavior, poaching, shirking, and overt sponsor dominance are capable of triggering significant conflict (Sherer, 1995; Kumar & van Dissel, 1996; Li & Williams, 1999).

Structural antecedents on the other hand are related to the differences in organizational structure (organizational differentiation) and business processes (structural differentiation) of the respective stakeholders. As most organizations are resistant to fundamental changes in their structure and operating procedures, this is definitely a source of conflict. Furthermore, if the inter-organizational network extends beyond national boundaries, the differences between national regulations and customary business practices could also cause conflict (Kumar & van Dissel, 1996).

Sometimes inter-organizational conflict transpires through the use of technology employed in support of building relationships, inter-organizational communication and business transactions. Typically such technological antecedents are only a reflection of structural or socio-political inadequacies and incompatibilities of interacting organizations. In some cases, however, the technological solutions can become the main cause of inter-organizational conflict. Technological antecedents are usually associated with mismatched IT infrastructures of the participant firms, the adoption of new and untested technologies by sponsors, or the overreliance on the business process improvement due to the technological change. However, regardless of the nature of the conflict antecedents, it is the process of system requirements determination that provides an opportunity to identify and minimize the effect of potential conflicts, including those sourced in cultural factors, at the earliest stage of developing technological infrastructure for the collaborating or competing organizations. Conflict, power and control have already been recognized as playing an important role in requirements engineering and have been previously studied in the context of organizational and multicultural project settings (Easterbrook, 1994; Bubenko, 1995; Thanasankit, 2002).

Researchers in Information Systems persistently declare cultural antecedents of conflict as posing one of the greatest challenges to the effective development and deployment of inter-organizational systems (Kumar & van Dissel, 1996; Li & Williams, 1999), of which web-enabled applications, being at the focus of our research, are simply the sub-class. Issues related to organizational culture are
commonly concealed, subtle, irrational, and developing over long periods of time, thus such issues are hard to detect, communicate and subsequently track. At the same time, in view of the prior research in organizational management and conflict, it is possible to distinguish two major classes of cultural antecedents of conflict (Schermersorn Jr., Hunt et al., 1997; Wood, Wallace et al., 1998), which are related to:

- *Organizational* differentiation, which occurs when the stakeholders follow different time horizons for their projects, have different goals and perspectives, and use distinct language and terminology;
- *Structural* differentiation, which may exists due to the difference in stakeholders’ rules, procedures, and policies.

Thus, our proposed method of detecting cultural antecedents of conflict is aimed at identifying situations, in particular in web development, where organizational and structural differentiations exist and as such which may lead to the development of acute and possibly recurring manifestation of conflict.

### DETECTION OF CULTURAL ANTECEDENTS OF CONFLICT

The presented framework for conflict detection, analysis and representation has been proposed by the authors (Sarkar & Cybulski, 2002b) to combine a number of analytic methods currently employed in other information systems development areas, namely viewpoint, stakeholder and domain analysis.

In requirements engineering, the methods of identifying system inconsistencies, and thus avoiding the potential risks and conflicts, include *stakeholder analysis* (Smith, 2000) and *viewpoint analysis* (Finkelstein, Nuseibeh, et al., 1994; Leite, 1996; Sommerville & Kotonya, 1996). Stakeholder analysis focuses on determining system stakeholders, their interests, influences, their similarities and differences, and their impact on the project. Viewpoints, on the other hand, represent the organizational and developmental knowledge as perceived by individual stakeholders. Such knowledge commonly provides a reference model for the requirements of the newly constructed systems. Comparison of viewpoints leads to discovery of inconsistencies in the stakeholders’ understanding of the web-enabled processes or in their respective policies.

Sommerville and Kotonya (1996) further extend the viewpoint approach by introducing the notion of stakeholder *concerns*. In general, stakeholder concerns impose constraints on system requirements and themselves are treated as obliga-
tory requirements for all systems in a given application domain. Compliance with organizational stakeholder concerns is critical to developing systems, which are less likely to cause or support inter-organizational conflict (Easterbrook, 1994). In web-based e-commerce systems, stakeholder concerns are usually related to the systems' accessibility, scalability, reliability, performance, security, and attractiveness of the web presentation (Abolhassani, 2000; Li, 2000). We define a “concern” as an issue voiced by a particular stakeholder with regards to some aspect of the proposed information system, which impacts the stakeholder's involvement in this system and which when addressed will determine selection of the system requirements (Sarkar & Cybulski, 2002c). If analyzed systematically, concerns could help uncovering cultural antecedents of conflict. As dealing with organizational and cultural conflict in software development is often a recurring event, developers’ experience in identifying and resolving the earliest stages of cultural antecedents of conflict should be captured, recorded and preserved for future use and reuse.

Past research indicates that stakeholders' knowledge, their characteristics, needs and concerns, as well as their requirements for systems in the domain, can be effectively reused between multiple projects within a single application domain (Prieto-Diaz, 1990; Arango, 1994; Cybulski, Neal, et al., 1998). Software engineering practice also suggests that reuse of various software life-cycle workproducts could lead to higher quality of software and more cost-effective systems, as compared with the systems produced entirely from scratch (Basili, Dieter, et al., 1987; Tracz, 1987; Prieto-Diaz, 1990). Reuse of requirements is especially relevant to web application development, where in the absence of a stable community of easily accessible stakeholders, system requirements are commonly inferred by developers rather than elicited from users in a systematic process (Gordijn, Akkermans et al., 2000). In this context, we have proposed and evaluated a method of identifying and analyzing developers’ experience in dealing with stakeholder concerns. These concerns include those regarding to differences in organizational cultures, of which concerns could be gathered and consolidated across an entire application domain, then packaged in a form suitable for discussion, training and dissemination, and subsequently reused from one web project to another (Sarkar & Cybulski, 2002a).

An effective form of packaging experience related to solving frequently occurring problem in a certain domain, in our case identification of antecedent cultural conflict in web systems, is known as patterns (Buschman, Meunier, et al., 1996; Rising, 1999). Patterns are known to be particularly effective in sharing and reusing expert knowledge in such applications as architectural design (Alexander, 1979), education (Anthony, 1996), design of organizational processes (Coplien, 1995), software development (Gamma, Helm et al., 1995; Buschman, Meunier,
et al., 1996; Fowler, 1997) and multimedia construction (Rossi, Schwabe, et al., 1997; Cybulski & Linden, 1998).

Patterns are fashioned to facilitate effective problem solving, i.e., identification of a problem in some specific context, understanding the reasons for the problem to occur and persist, selection of the problem solution, and predicting the consequences of applying a particular problem solution. Our conflict patterns are thus formulated according to the most commonly used pattern schema, which consists of the following components (Gamma, Helm et al., 1995, 3, 6-8):

- **Name** of the pattern;
- A statement of the **problem**, which calls for the application of a pattern or set of patterns to resolve it;
- **Context**, a description of the situation in view of which the problem has arisen;
- A set of **forces**, preventing effective application of certain classes of solutions to the problem at hand;
- The **solution(s)**, which describe(s) how the forces could be resolved in order to come up with the best solution;
- The **consequences** of applying the pattern in terms of the expected results and trade-offs;
- **Known uses**, or real-life situations where the patterns have been successfully applied in some form.

Viewpoints, concerns and patterns are an integral part of our approach to detecting cultural conflict antecedents. The model describing our approach is shown in Figure 1. The model shows two stakeholders, namely A and B, represented by stick figures. The stakeholders are two enterprises or two organizational that interact via a web medium. The two stakeholders are assumed to be culturally different in light of their viewpoints about work processes and "the way they do things." The number of stakeholders may vary depending upon their direct participation in a workflow.

As the participating stakeholders may have differing viewpoints on the workflow they jointly participate in, there might exist, in view of the assumptions made about cultural differences, antecedents of conflict. To counter such development, we capture the stakeholder viewpoints by identifying the stakeholder concerns, and subsequently comparing these concerns against the patterns collected in an experience base, depicted by the cylinder labelled "Domain Concerns" in Figure 1. If the match should occur, we use the patterns to guide web systems developers in the analysis of conflict antecedents, possible renegotiation of workflow requirements, and adopting a proven solution that is likely to reduce the stakeholders’ concerns about the adverse effects of cultural differences.
ANALYSIS OF STAKEHOLDER CONCERNS

We undertook our study of cultural antecedents prevailing in web development projects, by conducting in-depth qualitative interviews of stakeholders in the web-enabled Human Resource (HR) domain in Melbourne, Australia. Our choice of a domain was influenced by elite interviews with two e-business consultants (Marshall & Rossman, 1989). The consultants suggested the domain of web-based HR and payroll systems as of particular interest to the research, due to the recent adoption of web technology in outsourced and in-house HR and payroll services in Australia, the significant scale of the deployed systems, and the fact that cultural
issues are present in such systems. Based on their suggestions, we proceeded to collect comprehensive data reflecting stakeholders' concerns (Marshall & Rossman, 1989; Creswell, 1994), by conducting in-depth interviews with HR departments implementing web-based systems, web-based payroll providers, solutions developers, and application service providers (ASPs). This was supplemented by audiovisual materials, such as demonstration software and presentations.

The method we employed in this regard comprises of four steps, namely, the collection of concerns, analysis and recording of concerns, validation and consolidation, and packaging concerns into patterns. Figure 2 illustrates all of the conducted activities and provides a methodological framework for our study. It shows the stakeholders (shown as stick figures), activities (ellipses), and the output of each activity (rectangular boxes). **Description of the methodological steps follows.**

- **Collection of Concerns**
  This step involved the collection of comprehensive data reflecting the experience of web-based HR/payroll **initiators** and developers in incorporating the concerns of the most significant stakeholders, and the resultant system requirements that emerged (Marshall & Rossman, 1989; Creswell, 1994). The multi-case studies enabled us to gather rich data that could be used in establishing domain knowledge of concerns (Yin, 1994).
• **Analysis and Recording of Concerns**
In this stage, the collected concerns were looked upon as domain artefacts and their similarities and differences were subjected to analysis, in accordance with the principles of domain analysis. This allowed the determination of domain features (Arango & Prieto-Diaz, 1987; Kang, Cohen, et al., 1990; Prieto-Diaz, 1990; Arango, 1994; Kang, Kim et al., 1998). The data was analyzed qualitatively in order to spot regularities (Miles & Huberman, 1994).

• **Validation and Consolidation**
In order to represent the collected data as patterns that depicted cultural antecedents, it was imperative to consolidated and validate the stakeholder concerns. This was done through a series of structured follow-up interviews with the participants. In these interviews, the interviewees were presented with concerns collected across the entire domain to ascertain the relevance of these concerns to their particular organization, as well as to classify each concern statement as a pattern component, i.e., its problem, force, solution or consequence. Interviewees were also asked to provide some insight into their particular decisions associated with the concern’s relevance and its classification. The rich insight information was used to derive the context of each pattern. The consolidation and the relevance ranking were also helpful in shedding some light on the similarities and variation between the stakeholder concerns.²

• **Packaging Concerns into Patterns**
Finally, a series of structured interviews helped packaging the identified concerns into patterns as per the classification of their features. Such packaging allowed systematic representation, sharing and reuse of experience in dealing with stakeholder concerns among the domain developers. The packaging of concerns was the final step in the method.

**DISCUSSION OF FINDINGS**

Our findings revealed that cultural issues although recognized were not of outmost concern to providers of commercial payroll services. These organizations catered to small and medium-sized enterprises (SMEs). The commercial payroll provider acted as a hub in the web venture, and thus, the work culture of various clients did not have an overbearing impact on it. In fact, technological antecedents were more of a concern, as stated by a prominent member of the web team of one of the providers:
"...most of our clients are small businesses. So, they may not be at a stage where they could claim to be PC-ready or Internet-ready. So, we are more inclined to support them from a technical point of view."

On the contrary, the HR departments of organizations, which had deployed web-enabled applications to facilitate their interactions with other units, reported the prominence of cultural issues in the setting of system requirements. Furthermore, these organizations were all tertiary-level educational institutions consisting of various faculties and departments that differed greatly in their culture and outlook. The role of the HR departments was to provide support to these units, and in doing so, needed to comply and work alongside the peculiarities of the diverse cultures and modus operandi. Thus, cultural antecedents had to be dealt with in the establishment of requirements for the web-based systems. The importance of cultural issues was reiterated by one of the interviewees, a web system administrator in the HR department:

"The various departments have their own ways of doing things, which might have not much in common with each other. Besides, some of the people from these departments could be high up in the power structure (of the institute) and have their own little cliques. So, we had to be very careful when we approached them with our plans to involve them in the usage of the web system."

We also discovered that some of these concerns called for additional features to be included or restricted some of the requirement specifications. For example, supervisors could reject timesheets or leave applications submitted by employees without providing any explanations on the web, even though this was not initially intended by HR. The reason, according to the developer, was:

"Most of the users are academics. We cannot expect them to adhere to strictly enforced business rules embedded into the application. Moreover, if there was a problem with an employee document, they would rather sort it out internally without using the web system. So, we decided not to enforce the entry of rejection comments on the web."

Yet, another participant stated:
"They (the academic departments) were initially not keen on using the web system, because they thought this would change the way they have been working for years. This is why we had to take steps to clarify and explain the benefits of the web system to them, and the fact that this would not necessarily mean a radical change in their culture."

The initiators were also aware of the importance of informal communication mechanisms and nuances prevalent in the individual departments, which they took into account while embedding business rules into the applications. An instance of such a scenario related to the internal agreement that was made between a supervisor and an employee, when the latter was applying for leave for duration longer than for which he was eligible. In the words of the systems manager, responsible for overseeing the development and maintenance of the web system:

"Like I said, this (the application for leave) involves communication between the employees and supervisors within the departments. Usually, the employee would have spoken to the manager about this leave involving the extra days. So, these applications are already verbally approved even before they make it to the system. So, we have not actually hard-coded this (business rule permitting leave only for the period allocated) into system, as this would take away the flexibility (desired by the various user groups in view of their group cultures)."

Our case studies also revealed the manifestation of conflict between two entities owing to different cultural perspectives. The issue was associated with a security requirement involving the use of digital signatures, and was enforced upon the system by the developers in line with their culture of technological innovativeness. According to the chief developer:

"I think we are not at all behind in terms of the web-enabled HR system that we’ve developed. In fact, most applications in the domain don’t have digital certificates for authorization. So, we are using leading edge technologies."

A conflicting viewpoint on the issue of digital signature was held by the HR manager, who headed the division’s web initiative:
"While it is certainly true that digital signatures are far more secure than ordinary usernames and passwords, but the administrative burden of maintaining digital certificate technology, at the level of technology that was around at that time, far exceeded any benefits gained from the increased security. The burden of administration fell onto us (HR), but we were inadequately resourced to do this."

The end-users of the system were likewise, not keen on digital signatures either. From the feedback obtained as part of the incremental approach to the evolution of the web system, it was revealed that supervisors also considered the implementation of this technology as burden as it was time consuming to install and required additional training for effective usage of the technology.

Moreover, in the words of the HR manager:

"This digital signature initiative was railroaded by the developers, it was not an HR requirement... nor was it a requirement by finance for their part in the workflow (for which they use their own digital certificates). Since, the IT division (developers) knew how to use the technology (in line with their culture of going for cutting-edge stuff)... everyone else should use this... this was their justification. This impeded our progress in the roll-over and further evolution of the web system."

Ultimately, the feature was dropped as a consequence of the conflict, as stated, in disappointment, by the chief developer:

"We set the features... we put in digital signatures so that authorized personnel could sign on very securely. HR will then say, 'what's that?' to which we give our explanation. So, sometimes, when it's a new technology, it's our suggestion. But when it comes to the nature of transactions—what will be implemented and in what order—it is their specifications."

This was undoubtedly a conflict that manifested out of a cultural factor, though it took the form of a dispute over the adoption of a certain technology. Hence, the method enabled us to conduct in-depth studies into the various web-enabled HR applications and identify cultural antecedents of conflict as reflected by the concerns of the relevant stakeholders.
**REPRESENTATION OF CONCERNS AS PATTERNS**

Based on the elaboration of our empirical findings in the preceding section and in line with the steps in our method, we arrived at data that was cast into patterns. In this section, for the sake of brevity, we discuss two patterns that represent cultural antecedents of conflict in a particular business setting. These include the *No* 

*Table 1: A Sample Pattern 1*

<table>
<thead>
<tr>
<th>Pattern Name</th>
<th>No Comments Please</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem</strong></td>
<td>What happens if supervisors are concerned about spending too much time and effort while approving employee applications online?</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>The main workflows of a web-enabled HR system include the submission and approval of timesheets and leave applications by employees and supervisors, respectively. Ideally, web developers would embed business rules into the workflows to ensure that, in the event of a timesheet or leave application rejection, supervisors explain the reasons behind their decision, i.e., include comments. This is aimed at reducing hiccups in HR work processes due to grievances by anxious employees.</td>
</tr>
</tbody>
</table>
| **Forces**   | 1. Supervisors may not be willing to spend too much time carrying out online administrative tasks, especially if they are not entirely computer or Internet proficient.  
2. In many cases, employees and supervisors prefer to communicate informally within their work units with regards to matters of pay and leave.  
3. Unhappy supervisors will express aversion to online administrative tasks.  
4. Complaints will be lodged by anxious employees whose applications have been turned down without proper comments. |
| **Solution** | The system shall allow supervisors to make decision to online employee application without including comments |
| **Consequences** | 1. A separate set of access codes will ensure a simple yet secure level of supervisory workflow.  
2. It relieves the burden of the initiator’s dedication of vast resources in maintenance.  
3. Such a simple level of security may not be adequate for more mainstream financial transactions, such as purchase orders and large fund transfers. |
| **Known Uses** | Internet banking sites grant access to personal customers on the basis of account numbers and passwords. |

Copyright © 2003, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.
Table 2: A Sample Pattern 2

<table>
<thead>
<tr>
<th>Pattern Name</th>
<th>Simple but Secure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem</strong></td>
<td>What happens if supervisors and/or initiators are concerned with the use of digital signatures as a security feature?</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>Digital signatures are used to enforce security on open system, such as application on the web. These technological artefacts ensure, in the context of web-based HR solutions, that the approval of timesheets and leave applications are done by authorized personnel only.</td>
</tr>
</tbody>
</table>
| **Forces**   | 1. The maintenance of digital certificates necessitates the allocation of vast resources.  
2. The nature of administrative workflow tasks related to pay and leave approvals are very moderately sensitive.  
3. The installation and usage of digital signatures requires considerable time and training on the part of supervisors.  
4. Unhappy supervisors will express aversion to online administrative tasks. |
| **Solution** | The system shall designate a separate set of access codes for supervisors. |
| **Consequences** | 1. This requirements specification will ensure that supervisors use the web system  
2. It also alleviates supervisor concerns about the disruption of their divisional work practices.  
3. No online explanation for employees with regards to the rejection of their application. |
| **Known Uses** | Many websites allow registration or online booking without the inclusion of comments. |

Comments Please, and the Simple but Secure patterns, presented in Table 1 and Table 3, respectively.

The substance of the patterns was derived from the responses of the interview participants to the various concerns of cultural conflict, which have been discussed in our findings. It should be noted that the findings were obtained empirically from the data generated and qualitatively analyzed according to the method illustrated in Figure 2. Note that the problem statements of the patterns were actually requirement specifications about which stakeholders expressed concerns, while forces reflected the actual concerns identified. The solution component presents system requirements that were actually adopted in the organizations studied to alleviate
stakeholder concerns, while *consequences* indicate effects of the requirement artefact. However, the *Known Uses* section was not generated empirically, but came about through the authors' experience with applications in various domains.

The majority of patterns related to the cultural antecedents of conflict describe divergent views of two communities of stakeholders, each having different sets of concerns and priorities. For example, the *No Comments Please* pattern (see Table 1) captures the beliefs of both employees and supervisors (see forces) regarding their business rules and preferences. On the other hand, *Simple but Secure* pattern (see Table 3) seems to describe opinions of supervisors alone, yet it is dealing with the cultural issues of two stakeholder groups, i.e., supervisors and developers. The presented patterns illustrate the main point in this paper that the experience captured and packaged in patterns need to be written with a specific user in mind—in our case, the information systems developers, who are to avoid embedding conflicts from the social sphere of organizational interaction into the technological dimension of the inter- or intra-organizational system. The patterns serve numerous purposes, i.e., that of an organizational experience base (capture and codify experience), a communication and learning tool (dissemination of experience among developers), and finally that of a problem-solving tool (identification and elimination of cultural antecedents of organizational conflict). To be effective in its multiple classes of uses,
the collected patterns need to be well-written to facilitate their easy understanding by development staff, organized into a well-maintained repository to ensure their accuracy and timeliness, and thoroughly indexed to allow efficient access to patterns and their components.

In our work, we have created a repository of 27 patterns for the HR/payroll domain. The patterns have been collected and classified according to the features that emerged during our study of the applications in the domain. The major stakeholders in the chosen domains validated our patterns to ensure their correctness, their sufficient generality and their applicability and reusability for effective dealing with stakeholder concerns. The classification scheme is illustrated in Figure 3. Although many of the patterns focused on the technical aspects of developing and running HR services, many of the collected patterns addressed the cultural aspects of the system in place.

**SUMMARY AND CONCLUSIONS**

Cultural conflict poses a serious challenge to the development of all e-Business systems in general. The difficulty in dealing with such a conflict is two-fold. In the first instance, the ineffectiveness in identifying conflict antecedents accounts for the intractability of conflict. Secondly, the inability to determine and reconcile the incompatible perspectives and concerns of stakeholders interacting across the electronic networks that span organizational and departmental boundaries.

As there exist few practical solutions to dealing with this situation, we thus proposed a method of predicting the possibility of conflict due to cultural antecedents. Our method focuses on recording and collecting the experience of developers and project initiators in dealing with conflict antecedents across a particular application domain. The generalization, formalization, and packaging of such experience could enhance its reusability in new projects in the same domain (Basili, Dieter, et al., 1987; Biggerstaff & Perlis, 1989; Arango, Schoen, et al., 1993; Cybulski, 1996; Mannion, Keepence, et al., 1999; Rising, 1999). In our research, stakeholders’ concerns form the basis of reusable experience. They are captured from multiple domain sources in the form of patterns and they represent possible stakeholder viewpoints that may occur in some future projects. The cultural antecedent patterns are used to guide web system developers in determining inconsistencies of stakeholder viewpoints and their concerns over requirements for a proposed system. They provide typical solutions to alleviate such inconsistencies, reduce stakeholder concerns, and minimize the possibility of cultural manifestations.
of conflict, owing to organizational and structural differentiation of stakeholders, developing later in the system implementation or its operation.

We conducted a study of six HR and payroll systems provided by outsourced payroll companies and HR departments of organizations. To arrive at a collection of useful patterns, we had to devise a novel pattern mining procedure, based on a series of exploratory, consolidating and validating in-depth interviews and qualitative data analysis. In the process, we have discovered our method to be effective in collecting and packaging stakeholder concerns. Using a feature-based domain analysis, we have also discovered the similarities and variations in the stakeholder concerns, which enabled us to construct the classification of domain concerns. Such classification is useful in dealing with new domain concerns by instantiating them into high-level or low-level patterns.

Moreover, our studies revealed that cultural antecedents of conflict prevailed in a number of web-based system development projects initiated by HR departments. However, it was the identification of the stakeholder concerns that can lead to the reuse of relevant solutions. Thus, if the problems and the contexts pertaining to a new application in the domain match with that of the corresponding patterns that we have gathered, we will have an idea of what stakeholder concerns may be present implicitly, as well as how the solutions of the patterns can be adapted and applied in the new situation. Since patterns represent system developmental experience in a manner that is aimed at its reuse, such patterns should help identify antecedent conflicts and formulate a solution to minimize the manifestation of conflict, despite the complex nature of conflict ensuing from cultural differences. Our study of the web-based HR/payroll domain revealed concerns that were generic not only to the applications in the domain, but also to other web systems, such as web-based purchasing and procurement solutions.

The consideration of concerns and consequent reduction in conflict caused by organizational cultures is likely to support or ease the resistance to the adoption of new technology in organizations. This is especially important in light of cross-organizational workflow systems and virtual work groups, where there are diverse groups of stakeholders with varying viewpoints, owing to intra- and inter-organizational politics and various cliques are prevalent. In view of this diversity of the stakeholder base associated with web-enabled applications, a multitude of concerns exist and could potentially inhibit the optimal performance of workflow systems that support collaboration between the various stakeholder groups (Allen, Colligan, et al., 1999; Sarkar & Cybulski, 2002b) Therefore, the consideration of stakeholder concerns contributes to the understanding and appreciation of the cultural issues that prevail in web-information systems.
ENDNOTES

1 Initiators are organizations or organizational units that propose the e-business system to their trading partners or clients (Riggins & Mukhopadhyay, 1999).

2 Variations are those features, which are not shared by all applications.

REFERENCES


