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# STAKEHOLDER CONCERNS AND THE DEVELOPMENT OF WEB-ENABLED SYSTEMS: A CASE STUDY OF TWO WEB-PAYROLL VENTURES

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**ABSTRACT**

While the maturity and sophistication of web applications grow continually, web development practices are still in their blissful state of adolescent innocence, with ad-hoc requirements identification, perpetual cycles of evolutionary prototyping, and uncontrollable change. Some put this situation down to the rapid expansion of web infrastructure, and others see the source of this problem in unparallel complexity of e-business services deployed across the Internet. Research described in this paper, however, reports yet another explanation of the issue, asserting that the difficulties in web-based applications development are due to the existence of a large body of non-homogenous application stakeholders, all having distinct business and personal concerns, which are frequently transparent to developers seeking identification of functional requirements, later refined and implemented as the features of a web system. To illustrate our point, we provide examples of two commercial web-enabled systems, of which features are driven not only by the expressly stated system requirements but also by stakeholder concerns, which need to captured and analysed to result in a web-based solution acceptable to its users.

**KEYWORDS**

Stakeholder concerns, web-based payroll applications, web/e-business strategy, features.

# 1. 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 the designing of web pages for marketing purposes, to web-based applications that support business-to-business (B2B) and business-to-consumer (B2C) interactions, which are integrated with databases and other back-end systems (Isakowitz, Bieber *et al.* 1998).

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 applications typically undergo continuous refinement and evolution (Standing 2001, Ginige 1998, Nazareth 1998, Siau 1998). 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 and Vogelsang 2001).

Another core aspect of difference between traditional and web-enabled applications is the issue of stakeholders. A stakeholder could be defined as any group or individual who can affect or is affected by the development and implementation of an information system (Pouloudi and Whitley 1997). In traditional applications, stakeholders are comprises of a well-known group of people, usually within an organization. In contrast, a wide spectrum of stakeholders, both within and external to the organization, are actively involved in the use of a web application (Standing 2001, Carter 2002, Nazareth 1998). The importance of stakeholder issues in the development of applications has been highlighted by Sommerville and his colleagues (1996), who have presented the notion of stakeholder *concerns*. According to these authors, a concern, in general, can be considered a requirement, the compliance with which is critical to the success of the development process and the operation of the future system. Concerns, thus, need to be seriously considered before initiating any new software development (Smith 2000). Stakeholder concerns impose constraints on system requirements and themselves are treated as obligatory requirements for all systems in a given application domain (Sarkar and Cybulski 2002). Care should be taken to distinguish between concerns and other statements of requirements. Unlike some requirements, which can be negotiated and traded-off, concerns are critical in the development of information systems in that their compliance is essential to the satisfaction of stakeholders (Sommerville and Sawyer 1992).

From our review of research in the area of web applications development, we were able to assert the importance of stakeholder concerns in the design and development of web-based applications. In view of this, we were interested in finding out whether these concerns actually translated into the various features of the web applications. Moreover, we were also establishing what role the strategies of the initiators[1] played in this process. Hence, the questions addressed in this paper include:

1. Do the features of web-enabled applications reflect stakeholder concerns?
2. Does the initiating organization's e-business strategy consider stakeholder concerns?
3. Are variations of features across similar web applications an outcome of e-business strategies?

As part of our study, we investigated two web-enabled payroll applications, but used in very different business settings. One of the applications was being used as part of the Human Resource (HR) initiative in a

[1] Initiators are organizations or organizational units that propose an e-business system to their trading partners or clients (Riggins and Mukhopadhyay 1999).

tertiary educational institution, while the other was deployed as a medium through which an outsourced payroll company provided its services to its clients.

## 2. RESEARCH METHOD

The research design and methodology adopted for the purposes of this research is qualitative in nature and based on an *interpretivist* perspective. Therefore, we were interested in conducting interviews, observing the work processes undertaken via the web applications, and studying documents, with the aim of weaving together a "coherent picture" from these sources (Trauth and Jessup 2000).

Furthermore, the interpretivist approach was deemed suitable on account of its enabling us to understand a web system stakeholders and the initiating organizations and to develop a conceptual framework or a theory via an inductive process whereby, "immersion in the details and specifics of the data to discover important categories, dimensions, and interrelationships; begin by exploring genuinely open questions rather than testing theoretically derived (deductive) hypotheses" (Patton 1990).

Owing to the interpretive nature of this research and its design to examine the experiences, ideas and opinions of the developers of two similar web-enabled payroll applications but adopted in two very different business settings, it is not expected that this work will be generalizable to all ventures in which such applications have been deployed. The purpose of this study, however, was to examine and comprehend major issues with regards to the alignment of web application design, stakeholder concerns, and web strategies, which could lead to further research on a larger scale.

The novelty of web-enabled payroll solutions in Australia, and the relatively early and formative stage of research and theory in web-based information systems and e-business prompted us to adopt an exploratory case study approach (Benbasat, Goldstein *et al.* 1987, Sarkar and Cybulski 2002). Our choice of web-based payroll applications was influenced by our discussions with two independent e-business consultants, who indicated the novelty of such services in Australia, and how these were instrumental in changing the nature of payroll and Human Resource services that were being provided.

## 3. THE TALE OF TWO WEB SOLUTIONS

Having decided on an appropriate research methodology, we proceeded to conduct our case studies in the context of two organizations responsible for initiating two web-based payroll ventures, referred to as O1 and O2 respectively.

O1 is a renowned provider of outsourced payroll services, and has a global presence. It main client base include small and medium sized enterprises (SMEs), which have inadequate resources to undertake payroll operations in-house. Traditionally, O1 has provided services to its clients via conventional modes of communication, such as telephones, faxes, and documents being dispatched by courier services. In recent years, it has adopted a web-based information system as a medium through which it aims to change its mode of interactions with clients. This is in line with its web or e-business strategy of enhancing the value of its services to its existing clients, attracting new clients using its website, and streamlining certain internal operations, such as data entry. Even though the software tools were purchased from a vendor, the company set up a web development team, comprising of both marketing and IT personnel, to design the web application with aim of providing of optimal services (or rather e-services) to its clients, many of whom possess a minimum level of Internet proficiency. The development was carried out using an incremental prototyping methodology, whereby a simplified version of the website was put up for pilot study for a period of six months, during which feedback was gathered from the clients. According to the company source, the web system went "live" following the study and consideration of client feedback. It claims to follow an incremental approach, by continuing the process of eliciting feedback.

The other organization, O2, is the Human Resource division of a tertiary educational institution in Melbourne, Australia. The division was being supported by a legacy system, built in-house, that handled all payroll and HR-related transactions. The system was mainly being used by HR personnel. However, recently, it decided to adopt a web-based front-end in order to initiate interactions with the personnel of other departments within the institution. The web strategy was in line with its role as a division providing support services in an academic organization. However, the main objective of taking on a web infrastructure was to reduce and streamline certain, rather routine tasks, such as data entry and attending to employee queries. It contracted the development work to the institution's IT support division, the developers of the original HR system, to design the web application. The developers, in turn, reused the core components of the web-based student information system (which they had built), in developing the application. Like its outsourced payroll counterparts (O1), the developers of O2 proposed an incremental prototyping approach, which was actually undertaken in order to gather user feedback. The users comprised of all employees of the institution, both academic and administrative.

As we decided to carry out a cross-case analysis of the relevant phenomena, we hence proceeded with the collection of comprehensive data reflecting the developer experience in incorporating the concerns of the most significant stakeholders, in view of the web strategies of O1 and O2, and the resultant system features that emerged (Creswell 1994, Marshall and Rossman 1989). In-depth interviews were conducted with developers of the web-based services. This was supplemented by the investigation of audiovisual materials, such as demonstration software and presentations. In our work, we focused attention on two main groups of stakeholders, namely the initiators (also referred to as payroll), and the users who are the recipients of the web-based services. In the case of O1, the initiator was the payroll provider while the users were the clients. HR and the employees and their supervisors, were the initiators and users, respectively, in O2.

# 4. DISCUSSION OF FINDINGS

Our analysis of the collected data revealed several features that appeared in the design of the applications along with the concerns of stakeholders that they reflected. The data was analyzed qualitatively with the goal of identifying its regularities and patterns (Miles and Huberman 1994), which enabled us to determine the most significant design features and associated stakeholder concerns. Not all features appeared in both applications. Neither did some of the features accommodate all the associated concerns. Our findings are illustrated in Table 1, where for reasons of brevity, only seven most prominent features, as agreed upon by the interview participants, have been listed. Next to each feature, one or more associated concerns that were considered in the design of the web applications are stated. The third and fourth columns indicate the actual consideration of these stakeholder concerns in the two applications, *O1* and *O2*, respectively, where:

- *Yes* means that the concerns were considered,
- *No* implies that the concerns were not considered, and,
- *Partly* refers to the partial consideration of the concerns.

In the following sections, we explain the reasons behind developers' decisions in designing and subsequently implementing some are these stakeholder concerns.

## 4.1 Inclusion of all relevant concerns

The table shows that the features 1 to 4 incorporated common stakeholder concerns across both applications. One of these features included the system ability to initiate an online demonstration to guide users through the steps of the payroll process. This feature was recognized by developers as of high priority, as difficulties in training end-users of payroll applications were well-known - some of the users could not

**Table 1: Reflection of stakeholder concerns in the application features**

| Features | Concerns | O1 | O2 |
|---|---|---|---|
| 1. *Inclusion of an online demonstration on the web* | Limit on the number of training sessions that can be conducted. | Yes | Yes |
| | Users may not remember all the functions imparted the in training session. | | |
| | Some actual users may not have attended training sessions. | | |
| 2. *Very precise error messages* | Users need to be informed of data entry errors. | Yes | Yes |
| | Limit communication via conventional modes | | |
| | Vague error messages can frustrate users | | |
| 3. *Comprehensive online Help and FAQs* | Limit communication via conventional modes | Yes | Yes |
| | Users may encounter difficulties in the usage of the application. | | |
| 4. *Automated timesheet reminders* | Employees and supervisors may forget or be late in submitting timesheets | Yes | Yes |
| | Informing individual employees and supervisors of late submissions creates unnecessary payroll work | | |
| | Limit communication via conventional modes | | |
| 5. *Indication of the status of the pay process.* | Users expect transparency of the processes in a web environment | Partly | Yes |
| | Limit communication via conventional modes | | |
| | Employee concern regarding the outcome of the decisions made (approved or rejected) on their pay. | | |
| 6. *Data entered by employees themselves.* | Eliminate data entry tasks by payroll. | No | Partly |
| 7. *Queries and look-ups included.* | Limit communication via conventional modes | No | Partly |

remember many system aspects demonstrated during the session, others did not feel obliged to attend the training sessions.

Developers of both applications were also receptive to the fact that users might get frustrated if the system rejected their entry of data without a plausible explanation. Both initiators, O1 and O2, were also wary that in such a situation, users will undoubtedly flood them with emails or telephone calls, which would defeat the very purpose of deploying a web-based information system. Thus, developers ensured that precise error messages popped up to inform users of incorrect data entry. These concerns also prompted them to include comprehensive *Help* facilities and FAQs on the website.

Both applications also included automated timesheet reminders, to cater for those users who forget filling in and submitting pay timesheets on time. Manual reminding each user, by phone or in person, was practiced by in general viewed as unnecessary payroll work, and late submissions were considered a burden to the payroll business. Thus, the web-based system was programmed to automatically dispatch reminders a few days prior to the due date.

## 4.2 Exclusion/Partial Inclusion of relevant Concerns

Some of the stakeholder concerns were not actually included as features in the design of the applications. Others were inculcated but not enforced. One such feature (the 7th feature in Table 1) was related to the issue of enabling users to view their pay and leave history online. The feature was partly implemented in O2, i.e. employees could view their leave history, but not their pay records. The developers of the O2 application, in response of the exclusion of the latter, stated:

> *"This is another thing HR wanted us to do this year (2001), but we did not receive the specifications for this."*

Therefore, even though the concerns were voiced in support of a web-enabled look up of pay records, the initiator, HR, did not include the feature as part of their specification. However, owing to the exclusion of this feature, HR's concern of limiting queries by conventional modes of communication was not satisfied. It still had to respond to employees through the telephone and in person. In case of O1, this feature, though recognized in view of the relevant concerns, was entirely left out in view of its e-business strategy. O1 granted web access to the client contact only. Individual employees were not authorized to use the application. However, even the client contact was not able to trigger web queries or look ups. According to O1:

> *"Well, he's (the client contact) got a few options. He could ring us, and we'll tell him. He could fax the query to us, and we'll respond in writing. Or, he could check his reports (clients get printed or hard copy reports). Or, he could get soft copies of these reports from the web…he just needs to go to the web and check the reports from there – the information's all there. There's, of course, a charge for each additional report."*

O1 treats the end result of each web-based process as a deliverable, and thus subjects a price structure to it in line with its e-business strategy. In fact, it was not entirely concerned with having to respond to client queries via non-web modes of communication. The following statement of O1 clearly explains their web strategy:

> *"We want to add more value to the services we offer our clients. We also want to add a personal touch to our clients. Our staff should be available to answer client queries, rather than spend time keying in data. Thus, the main objective was to add more value to our services rather than merely reducing the cost of the payroll process."*

In contrast, the web application deployed by O2 is part of its IT infrastructure, and is used to support its role in an academic institution. Its aim was not to render payroll services for a fee, as practiced by outsourced payroll providers, but to reduce overhead.

> *"…they (HR) mentioned that employees were keen on knowing about their leave entitlements prior to taking the leave. So, we decided that, on the web-based interface, employees would be able to look at their entitlements. This eliminates their need to ring up HR before filling up their leave form. So, we made that sort of information available on the web."*

As access to the web-based services was restricted to the client contact only, O1 application did not require the filling of personal data and timesheets by the individual employees. In fact, as far as it was concerned, it only interacted with its client contact. The issues surrounding employees was considered an internal matter of the client firms. Conversely, O2 adopted the notion of shifting data entry at the "source", and thus, web forms were included in the user interfaces for employees to enter their personal details and leave applications. However, these excluded the provision of online timesheets for individual employees. When asked about the absence of this feature, the developers reiterated:

*"…some users would like additional functionality, like web timesheets, the ability to put in not only qualifications but also if people can obtain staff development and training. There are additional features we can implement, but we just never have the time."*

Related to the preceding feature, status indicators, showing at what stage of the approval process the timesheet was at, were fully incorporated in O2 application, but only partially in O1. This was due to individual employees not having access to O1 application (thus, no status indicated to them). However, upon submission of all timesheets pertaining to a pay period, email notifications were sent to the client contact informing of the status of the payroll process. On the other hand, O2 application, which catered to both supervisors and individual employees in the organization, provided this information on each user's web profile.

# 5. CONCLUSION

The empirical studies, involving a cross-case analysis of two web-based payroll services, enabled us to ascertain whether system developers actually considered stakeholder issues in their work on the design of web-enabled applications. We also gained insight into the web or e-business strategies of the participating organizations, as well as how these strategies influenced the developers' consideration of the various stakeholder concerns for translation into design features. Hence, the two questions, presented in the Introduction section, that drove the direction of our studies, can now be addressed.

***Do the features of web-enabled applications reflect stakeholder concerns?***

Our investigation revealed that a number of design features of web applications were in fact a reflection of the concerns of the stakeholders, namely payroll and the users (employees, supervisors, and clients). Many of these concerns were uncovered while analyzing the feedback from the stakeholders during the "beta" testing of the applications. Some of these concerns also called for additional features to be included or restricted some of the requirement specifications. For example, in the O2 applications, supervisors could reject timesheets or leave applications submitted by employees without providing any explanations on the web. The reason, according to the developer, was:

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

***Does the initiating organization's e-business strategy consider stakeholder concerns?***

It was evident that the web strategies of the initiators were of outmost importance to the design of the web infrastructure. Thus, developers decided not to include some of the concerns, as these were not in alignment with the strategy-driven requirements of the initiators. This can easily be understood in view of the fact that developers look upon project initiators as their "clients", due to which the satisfaction of their needs is first and foremost.

***Are variations of features across similar web applications an outcome of e-business strategies?***

The variation in features across the two applications was apparent, though a number of core features were implemented identically. From our findings we discovered that the variations were a result of the differences in the web strategies of O1 and O2. Ofcourse, the strategies of an outsourced payroll provider are undoubtedly different from that of the HR division of an academic institution, and these definitely influence their adoption of web-based information systems, as well as the choice of design features.

Our research has enabled us to clearly draw a link between the strategies of organizations adopting a web medium to conduct operations, the concerns of the stakeholders involved, and the features that actually appear on the design of the resulting applications. Ongoing research is being directed to the in-depth study of other web-enabled payroll applications in Melbourne for the purpose of developing domain knowledge that could can serve as learning tool for researchers and practitioners, and contribute to the development of domain-specific web-based application models on basis of concerns and e-business strategies.

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