**Association for Information Systems**
**AIS Electronic Library (AISeL)**

2002

# Deferred System's Design: Developing Context Aware Information Systems for Dynamic Environments

Nandish Patel
*Brunel University*, nandish.patel@brunel.ac.uk

Yvonne Ditrrich
*Blekinge Institute of Technology*, yvonne.dittrich@bth.se

Alan Eardley
*Staffordshire University*, w.a.eardley@staffs.ac.uk

Mark Lycett
*Brunel University*, mark.lycett@brunel.ac.uk

Follow this and additional works at: http://aisel.aisnet.org/ecis2002

# DEFERRED SYSTEM'S DESIGN: DEVELOPING CONTEXT-AWARE INFORMATION SYSTEMS FOR DYNAMIC ENVIRONMENTS

**(Panel)**

**Moderator:**

**Nandish V. Patel**

Department of Information Systems and Computing, Brunel University, Uxbridge, UB8 3PH, England U.K., Email: nandish.patel@brunel.ac.uk Phone: +44 1895 20339


**Panelists:**

**Yvonne Dittrich**

Department of Software Engineering and Computer Science, Blekinge Institute of Technology, Softcenter. Box 520 S 37225 Ronneby Sweden. email: yvonne.dittrich@bth.se Phone: +46-457-385842


**Alan Eardley**

School of Computing, PO Box 334, Staffordshire University, Beaconside, Stafford ST18 ODG UK Email: W.A.Eardley@staffs.ac.uk Phone: +44 01785 353456


**Mark Lycett**

Department of Information Systems and Computing, Brunel University, Uxbridge, UB8 3PH, England U.K. Email: mark.lycett@brunel.ac.uk Phone: +44 1895 20339

## 1. MOTIVATION

Diverse areas of business, healthcare, and government require IS that can respond to their environment. Conceptions of IS and development approaches have tended to remain sole preserve of professional developers. IS that can respond to their environment require conceptions and mechanisms that enable people in work to actively develop systems. This is the theme of deferred system's design.

Internet, intranet, network and other technologies are being pushed to function at the client end, influenced by clients' needs rather than being controlled by the network operators. The same is the case for IS applications in business, healthcare and government. The problem is even more pertinent in mobile ecommerce where the use of mobile devices are embedded in their physical environment, that is closely coupled to the physical location of the user. The problem we address concerns evolving and adapting IS, and its development approaches, including project management, to the context of IS use, where the evolution and adaptation is enacted by individuals, groups and organizations as a whole, rather than pre-specified and hard-wired into systems.

1638

## 2. AIMS

The aim of the panel is to bring a multi-faceted perspective onto the problem of developing deferred systems. The panelists come from academia and government, and their interests range from design research, software development, project management and business strategy.

The problems we seek to address are various and pertinent in the age of corporate change, where the dictum seems to be change is all around. These problems concern how we evolve and adapt IS, and how we can cater for contextual information needs. They concern the intertwining of business strategy and changing business strategy in IS and information management from an organizational persepective. In terms of development, the foremost problem is successfully managing IS development projects and successfully managing IT/IS change during corporate re-organisation or mergers.

Various solutions have been proposed to address these problems. Tailorable software, object-oriented techniques, and designing for context are some proposed by software developers and IS researchers. Quality of service (QoS) for the Internet and Web applications is proposed by network researchers and engineers. Organisation theorists and researchers propose that IT enables organizational change, whilst others argue that the social infrastructure will dominate over technological forces. Despite these developments, we still lack adequate theories, design guidelines, development principles, and frameworks. In particular, we lack useful constructs to guide us to develop IS that are responsive to their environment. Research funding bodies have begun to recognize this gap and are actively seeking to fund research into "programmable networks".

Basic research in this area needs to focus on how we identify and define the problem better. It is probable that previous knowledge on problem structuring may not be the approach to take, as it stems from the paradigm of objective and rational thinking. Technologically, we need basic research into how we can assess the capabilities of current technologies to meet the challenges of using digital technology in, not only a human, organizational context, but in a context that is dynamic and one that requires multiple interests to be satisfied.

Application research is even more challenging. Industry is struggling to apply the available technology to their problems of contextual information and mobile, programmable networks. For teachers, the lessons from basic research and application research are both necessary to impart the right knowledge to equip students to actively solve problems in their working lives.

## 3. DEFERRED SYSTEM'S DESIGN

Deferred system's design (DSD) provides some elements to consider in designing context-aware IS. Most context-aware systems record information on users' actions for later use. In IS this is reflected in work that seeks to predict users' future requirements. The IS design is based on predicting what users will require in order to implement adaptation. The DSD approach does not seek to predict specific future uses of an IS or develop designs on a predictable basis. It proposes some design principles that can be used to develop a basic research agenda in deferred design. Location can be a parameter that can be defined in electronic and physical space. Identity can act as the mechanism to allow a person to access and determine what contextual information needs to be processed. Time is the dimension that determines the relevance of the information provided, particularly for systems that support decision-making at executive levels. Environment (Activity) describes the artifacts and the physical location of the current situation.

Developers would need to build these into deferred systems and enable users to match their environment or context to the system through tailorable software. *A deferred system is deferred until the user decides what the system will become.* In philosophical terms, this provides for ontological and epistemological relevance of the system to users' *being*. In business terms, it caters for the situated needs of system users. An example of a deferred application, which a user may create, is a financial derivatives product that may be demanded in a particular set of market conditions that emerge, and

1639

which could not have been predicated when the system was designed. This type of user is termed an *action developer*. IS design activity needs to be researched and discussed in terms of who we accept as an IS developer and what constitutes IS design activity. Recent developments in IS now make it possible for us to broaden our perspective on IS design activity to include action developers and on-line design and implementation. In particular, the feature of tailorable information and knowledge exemplifies deferred systems in practice.

The spreadsheet is an early example of deferred system design. It was developed to enable action-based application development. The developers designed the core tailorable system architecture. This architecture enables action developers (business users) to tailor data structures and define processing for particular contexts and situations. The run-time functionality design decisions are deferred to action developers. The result is a deferred decision support system. The actual run-time functionality of a spreadsheet application, or its phenomenological information design, is entirely determined by the action developer. Such design is generalisable across vertical software development. For example, it is used in application framework development, where the design decisions concerning actual application development are deferred internally among professional developers. The unique property of deferred systems is that data, information, and knowledge is treated as tailorable.

Software development in DSD is consistent with the post-modern view of software. The era of planned releases of systems projects is passed, and business organisations have to extend the functionality of systems over short periods and at low costs in response to various organisational and economic competitive factors. Attempts at capturing a full set of systems requirements to write a complete system specification have proved unachievable with the usual picture of cost overruns and failed delivery times. New alternative models like the distributed model of open source code development are emerging. It is difficult for IS design activity to remain bound in projects. Action-based IS, DSD, and action developers are positioned as contributing to the trend in alternative models for social software development.

## 4. RESEARCH TOPICS

Nandish Patel will propose that unknowable and unpredictable information needs can be designed, drawing on the distinction between specified systems and deferred systems. The idea of a deferred system and deferment in general, has been applied to project management and, conceptually, to context-aware mobile information systems for ebusiness. Deferment point analysis (DPA) is a technique that is being developed to identify points in a project's life cycle that may require future functionality added to a system. An IS development case in government will be used to illustrate the application of deferment in practice, focusing on its utility for project managers. Deferment leads to successful project completion. The case of the Life Events Access Project (LEAP) will be evidenced.

Mark Lycett will propose that a service-based approach to business and systems development provides the basis for an extreme form of deferred system. The challenge for business is to understand how services can best express business capability. The challenges for IS developers are (a) to provide a seamless mapping to automation of services via components and (b) to understand how architecture can be used to fleixibly bind services that have differential rates of change. These concepts will be presented through ongoing commercial case studies.

Yvonne Dittrich will talk about design for change from a software engineering point of view. Here the challenge is to anticipate change and to evaluate solutions in relation to use, development and technical environment. She will argue for 'flexibility light'. Taking the concrete project context into account, lightweight solutions are possible that are based on standard software and techniques.

Alan Eardley will propose that IS need to support flexible business strategy. The application of existing techniques that support flexible business strategy will be discussed. The research aims to develop a descriptive framework supported by practical techniques to develop strategic IS. He

examines a framework encompassing development methods that will produce more flexible strategic IS/IT applications.

## 5. THE STRUCTURE OF THE PANEL

Panelists will have met before the panel to identify commonalities, these will be presented to the audience as a backdrop to the field. Panelists will then pose their particular problems in their research or practice fields. The panel is then opened up to the audience for the bulk of the session to discuss the problem of developing deferred systems or context aware applications, that are capable of evolving and adapting.

1641