

Constructing a web information system development methodology

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Abstract. *This paper reports on the extension of the Multiview framework to web-based information systems. The aims are firstly to investigate the appropriateness of Multiview – a pre-Internet analysis and design methodology – to web-based information systems and, secondly, to reflect on the nature and role of methodology, as distinct from method, in the information systems (IS) development process. A 2-year e-commerce development project in a small to medium enterprise is the setting for learning through action research. To distinguish the project from consultancy, a framework of ideas – Multiview – is declared and tested in the research process. The differences and similarities of pre-Internet and Internet-based projects are analysed and reported on. At a higher order of learning the project provided an opportunity to reflect on how methodologies are constructed in practice.*

Keywords: Information system development, Multiview, Internet, e-commerce, methodology, action research, web

INTRODUCTION

Many of the new methodologies aimed at the development of web sites have focused on the user interface (and in particular the look and feel), but have failed to address the wider aspects of web-based information systems (Howcroft & Carroll, 2000). At the same time, traditional pre-Internet information system (IS) methodologies have struggled to accommodate web-specific aspects into their methods and work practices. A notable exception is Connallen (2000), who has adapted the unified modelling language (UML) to web applications. Although web sites can be characterized historically as graphically intense hypermedia systems, they have now evolved from cyber-brochures into database-driven information systems that must integrate with existing back office applications within the organization, and often need to connect with trading partners and other stakeholders. Web-based IS therefore require a mix of web site development techniques together with traditional IS development competencies, such as database design and program design.

This paper reports on an action research project that spanned two years and involved the building of an e-commerce application for a UK-based small to medium enterprise (SME)

working in the food and drink industry. From a research viewpoint a 'theory', the Multiview methodology (Avison & Wood-Harper, 1990; Avison *et al.*, 1998), is being tested by its practical application to the construction of a web-based IS. The methodology that emerged from the application of Multiview in this context is a web IS development methodology (WISDM). The learning outcomes sought through the action research are: (1) to understand the changes to the content of pre-Internet methodologies needed to address the specifics of web-based IS; (2) to consider the differences between web-based IS development and traditional IS development; and (3) to reflect more generally on the role of methodology in IS development. To this end, the paper is organized as follows. In next section, the research design and methodology are introduced. In the third section, the framework of ideas to be tested, Multiview, is described, and in the fourth section the client organization is introduced. The emergent content of the web IS development methodology, WISDM, is described in the fifth section. In the sixth section, differences between pre-Internet IS and the web-based IS are considered, together with reflections on the role of methodology in IS development. A summary is given in the last section.

RESEARCH METHOD

Action research was used in order to learn about the actual and situated practice of web IS development through first-hand experience. In making an intervention one seeks to avoid the distorting lens of purely theoretical approaches to the study of IS development: the unattainable ideals and hypothetical 'straw men' of utopian development in which the methodical is privileged over the amethodical (Truex *et al.*, 2000). The roots of action research can be traced back to Lewin's (1948) work on social change and social conflicts, through the Tavistock Institute's work on socio-technical theory (Emery & Trist, 1960), Checkland's (1981) view of human activity systems, to the Multiview methodology (Avison & Wood-Harper, 1990). Avison *et al.* (1999: 95) build on this tradition to argue that for academics to read about systems development, write case studies, and even build their own methodologies, is not enough:

In action research the researcher wants to try out a theory with practitioners in real situations, gain feedback from this experience, modify the theory as a result of this feedback, and try it again. Each iteration of this action research process adds to the theory – in this case a framework for systems development – so that it is more likely to be appropriate for a variety of situations.

According to Checkland (1991), the definition of a framework of ideas is important if action research is to be rigorous and have validity. It also helps to differentiate action research from consultancy (Baskerville & Wood-Harper, 1996). The aim of the action research project reported in this paper is to find out about web IS development using Multiview as a framework of ideas to be tested through intervention. The client organization in which the framework of ideas is tested is Zenith International, a company specializing in consultancy to the food and drinks industry. More specifically, the area of application for the action research is

the Global Drinks Service (GDS) e-commerce project, which ran from October 1999 until September 2001.

THE FRAMEWORK OF IDEAS – MULTIVIEW

Multiview originated as a response to traditional IS development methods that had strong roots in engineering discipline and technical rationality. The extension of structured programming into structured analysis and design was, perhaps, a logical progression that resulted in IS development methods such as information engineering (Martin, 1989) and structured systems analysis and design method (SSADM) (CCTA, 1990). The process of taking successful programming strategies and broadening them out into design and analysis methods continued unabated with the object-oriented (OO) paradigm, with OO programming being extended into OO analysis with methods such as Rumbaugh *et al.*'s (1991) object modelling technique (OMT). A convergence of 'best of breed' OO methods led to the unified modelling language (UML) notation (Booch *et al.*, 1999). Although there are certainly differences between the structured and OO paradigms, the philosophical foundations are shared – a functionalist paradigm of objectivism and social order (Hirschheim & Klein, 1989; Hirschheim *et al.*, 1995). However, engineering-based approaches to IS development can lead to an overemphasis on the design and construction of computer-based artefacts, with insufficient attention given to the social and contextual aspects of IS development. Hirschheim *et al.* (1996) take the view that the changes associated with system development are emergent, historically contingent, socially situated and politically loaded. As a consequence of this position they argue that sophisticated social theories are needed to understand and make sense of IS development activity.

Multiview supports an even-handed approach to IS development, where a sociotechnical solution is sought. Multiview is structured in three tiers: general framework, local methodology and methods/techniques (collectively these constitute 'Multiview'). The Multiview *framework* (Figure 1) is used to inform the emergence of a situation-specific and local methodology; at its best it is the result of a genuine engagement of the IS developers (change agents) with the problem situation. This engagement, which is historically contingent and locally situated, informs the choice of methods and techniques, such as object-oriented design and job satisfaction design, that will be used to get things done. The IS development methods matrix (Figure 1) categorizes methods in two dimensions: socio (a concern with the organization and individuals) and technical (a concern with the 'things'), and analysis ('what' is required) and design ('how' it will be achieved). Engineering-based approaches to IS development concentrate on the right-hand side of the matrix: the generation of a requirements specification and its refinement into a software model, whether this process be stepwise, as in the waterfall lifecycle, or iterative, as in rapid application development. The overtly social left-hand side is downplayed and left to fend for itself, but is always present, whether the developer likes it or not.

In the Multiview framework the role of the IS developer is itself recognized as complex and not reducible to a single perspective. In unbounded systems thinking Mitroff & Linstone (1993) argue that complex problem solving requires the application of as many disciplines, profes-

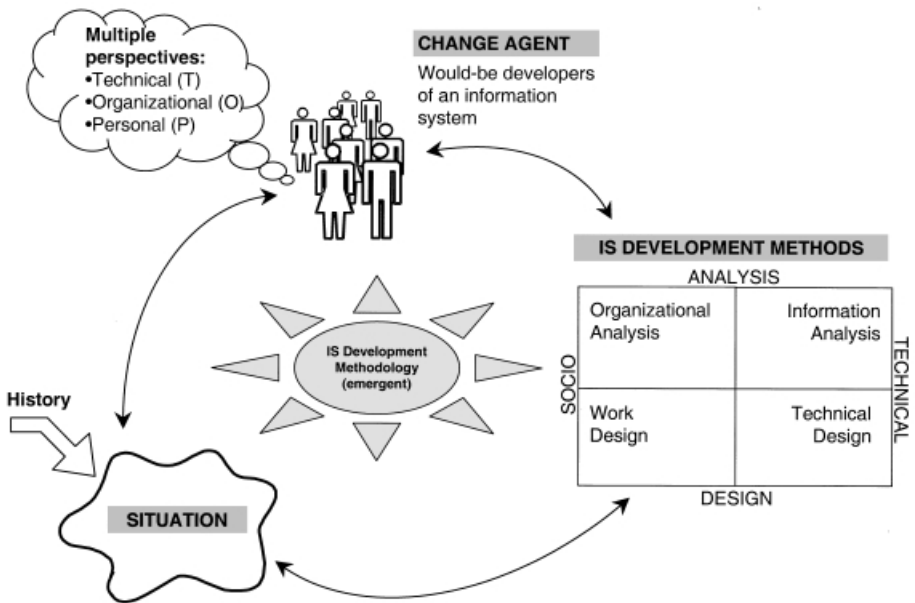


Figure 1. Multiview framework for IS development (adapted from Avison *et al.*, 1998).

sions, and branches of knowledge as possible, with each one employing different paradigms of thought. Mitroff & Linstone identify three perspectives: the technical (analysis) perspective (T), the organizational (societal) perspective (O) and the personal (individual) perspective (P). The O and P perspectives are essential in making a bridge between analysis (T) and action, helping the developer to think about the human and social factors that are replete in complex problems, including ethical aspects (Wood-Harper *et al.*, 1996).

Thus, according to the Multiview framework, an IS development methodology (whether web-based or otherwise) is emergent only in practice through the interaction of developers, methods, and situation. Multiview is therefore more usefully seen as a metaphor that is interpreted and developed in a particular situation, rather than as a prescriptive description of some real-world activity (Watson & Wood-Harper, 1995).

THE CLIENT ORGANIZATION

The client organization in 1998

Founded in 1991, Zenith International Ltd is a business consultancy specializing in the food, drinks and packaging industries worldwide. The main business activities are market analysis, strategic advice, technical consulting projects and conference organization. In spring 1998, the strategic aims of Zenith were to create a global presence, to broaden the product range

and to develop complementary skills (e.g. a synergy of market intelligence reports and consultancy). In September 1998, Zenith launched its first web site. The adoption of the Internet by Zenith is explained well by Mehrtens *et al.* (2001), whose model comprises three factors: perceived benefits (e.g. sending product information to prospective customers), organizational readiness (e.g. high levels of Internet familiarity by staff and senior management support), and external pressure (mainly from existing customers who want the firm to communicate with them electronically).

Zenith can therefore be categorized as a stereotypical SME Internet adopter. Given these factors, it is not surprising that the first stage of the web site implementation was to create a web presence and to provide marketing information about Zenith companies and their services and products. Although customers could not buy digital documents on the web site they could place orders online for subsequent delivery of paper reports. Two of the most successful features of the site were the online conference booking forms and the Chairman's newsletters. In summary, the site was a typical cyber-brochure informational site: with elementary order-taking facilities.

The Zenith global drinks e-commerce project 1999–2001

Analysis of competitors showed that the larger market research companies were making reports available online (e.g. Gartner, Datamonitor) and issuing user identification and passwords to customers. The success of the company web site launched in 1998 gave Zenith the confidence to explore e-commerce and the online delivery of market research content. In October 1999 Zenith and the University of Bath established a 2-year teaching company scheme (TCS). The aim of the TCS programme was to develop the skills of the teaching company associate (a recent MSc graduate of the University of Bath), to transfer knowledge from the academic institution via the academic supervisor (the current author) to the company (Zenith), and to achieve a tangible business benefit for the company. The associate was employed on a full-time basis by the university for the 2-year life of the project, but based in the company's offices taking day-to-day direction from the industrial supervisor, a manager at the company.

The objective of the TCS programme was to build an online Global Drinks Service (GDS). In 1999 the GDS was a paper-based survey of beverage consumption data, together with textual analysis, for all countries with analysis across product groups (e.g. soft drinks) and products (e.g. bottled water, fruit juices). This information is of value to the marketing and planning departments of organizations involved in the drinks industry, including ingredients suppliers, manufacturers, retailers and packagers. In its paper form a customer was expected to buy the complete survey – all countries, all products, all years – and to renew a subscription on an annual basis if it wanted a new report with updated consumption data. By making this information available online Zenith would be able to supply information in 'byte-sized' chunks on demand.

The formal organization of the GDS project required regular steering committee meetings and technical meetings. Steering committee meetings were held every 3 months and attended

by the Chairman of the company (the programme facilitator), a representative of the Teaching Company Directorate, and all the members of the project team. Technical meetings were held monthly by the project team to review progress and to document actions and decisions. In writing up this research the author (Academic Supervisor) drew on the original project proposal, minutes of steering committee and technical meetings, company documents, project reports and deliverables (e.g. design documents), the GDS application itself, and the author's personal research diary.

Outcomes of the intervention

The project plan anticipated version 1.0 of the GDS being complete 12 months into the 2-year project, with the remaining 12 months being used for monitoring and iterative development. In Internet time 12 months might well seem to be excessive, but the timescale needed to reflect the training requirements of the associate, who was a novice developer, and allow the associate to gain experience and confidence through technically less demanding pieces of work, such as a redesign of the company's main web site. Throughout the project rapid application development and prototyping were used. This approach allowed Zenith researchers and managers to see a working system quickly and for the developers to continuously check their understanding of the requirements. The internal prototype was evolved into a production system, culminating with the first live version of the GDS being delivered ahead of schedule 10 months after project commencement. This first release allowed for end-to-end purchasing: customers could select the data they wanted to purchase, pick a user ID and password, pay by credit card using a secure third party, and have immediate access to the data purchased (www.globaldrinks.com). Once the initial version of the GDS was delivered, new releases followed at roughly 2-month intervals. New facilities included more sophisticated calculations (e.g. country to country comparisons of percentage growth in beverage consumption per capita) and improved graphical presentation, a report store allowing textual commentaries to be purchased in Adobe Acrobat (PDF) file format, a database of more than 1500 links to drinks manufacturer sites, an email news service, daily news available by mobile telephone using WAP (wireless application protocol), and real-time generation of user-selected data in the form of an Excel spreadsheet. A revenue stream of GDS sales was created in the first year of the project and the financial targets for revenue generation specified in the project proposal for the 2-year period were exceeded. From a TCS and company perspective the project was judged to be a success. In the context of an e-commerce Web application, the GDS project led to some significant changes in the methods matrix that will now be considered in turn.

WEB IS DEVELOPMENT METHODS

The methods used in the development of the GDS are presented using the four quadrants of the methods matrix in Figure 1. The aim is to contrast the indicative and stereotypical methods

of Multiview with what actually happened in practice to gain an insight into the effectiveness of a traditional IS development approach to web-based IS.

Organizational analysis

The primary method for organizational analysis in Multiview is the soft systems methodology, SSM (Checkland, 1981; Checkland & Scholes, 1990). SSM is particularly relevant in situations characterized by complexity and pluralism of stakeholder interests (Flood & Jackson, 1991). By contrast, the GDS project was perceived by the client organization to be simple/unitary. In organizational terms the project was 'simple' – it was an e-commerce bolt-on to existing operations (i.e. another channel for marketing and sales). Stakeholder interests were unitary, i.e. there was agreement on both the ends – success would be measured chiefly by the ability to generate revenue – and the means. Given this reading of the situation, the explicit introduction of SSM would not have been perceived as meaningful. However, some form of organizational analysis was needed. For an e-commerce project an external orientation is essential, as the aim is to sell products and services to customers. The organizational analysis consisted of building an e-commerce strategy for Zenith and conducting a market survey. The e-commerce survey was concerned with aligning the development project with Zenith's wider business strategy in the context of industry forces (Porter, 1980). The market survey focused on customers and included a postal and telephone survey to determine attitudes to the Internet, e-commerce (particularly making online payments), and confirm their research information requirements.

In the Multiview methods matrix organizational analysis can be thought of as generically concerned with value creation. In Multiview this has been the traditional province of SSM, where a systemic transformation creates benefit (or disbenefit) for a Customer. Of course, this is 'below the line' thinking in SSM (i.e. it is not a model of a real-world transformation), but all the same the aim is to give insight into purposeful activity and meaningfulness, which can be broadly constituted as value creation. Strategy models such as Porter's (2001) five forces and Timmers's (1999) e-commerce models are prepackaged 'hard' guides to thinking about purposeful activity. Thus, the overall aim of organizational analysis is the consideration of how value will be created. The approach taken might be to use soft methods, such as SSM, or hard methods, such as prepackaged strategy and e-commerce models, or indeed a combination of the two.

Information analysis

The stereotypical methods for specifying requirements from the technical rationality perspective is the unified modelling language, UML (Booch *et al.*, 1999). UML use cases were developed to describe the major functionality of the proposed system, including registration and purchase, research queries, and maintenance. Given that this is a data-intensive application that would be implemented around a relational database, it is not surprising that the heaviest use of UML was in the development of class diagrams. Limited use was made of OO princi-

ples, such as encapsulation and inheritance, because it was known that the implementation environment had no explicit support for OO mechanisms. Although the analysis was approached from a logical stance, i.e. independent of the implementation platform, the methods used were influenced by the choice of technical platform for implementation. Some use of UML sequence diagrams was made, but, again, the target environment meant that these were perceived as having less value due to a knowledge that the implementation would take the form of web pages – an environment notoriously antithetical to OO (Connallen, 2000).

Work design

In classic form, Multiview draws on the ETHICS approach to sociotechnical design (Mumford, 1995). ETHICS is concerned with achieving a suitable match between job satisfaction – the fit of an employee's job expectations and the job requirements as defined by management – and the efficiency objectives of the organization. The GDS project was conceived as a stand-alone initiative that would target external customers and have minimal impact on working practices within the organization. In practice, this was not entirely the case. The initial load of the GDS data to the database was a typical development activity, i.e. data conversion. However, 9 months after implementation it was necessary to load in the next year's data. This was a routine system procedure that did impact on the internal business processes of the research department, i.e. the GDS project had implications for work that had not been accounted for. If the annual updates had met with user resistance from the research staff who were not involved directly in the GDS then the project may have faltered. Although a full-blown ETHICS investigation would have been inappropriate to the GDS project, the experience served as a reminder that even the most independent seeming of projects can have an impact on work practices.

The primary user of the GDS was the external customer. Customers use the GDS to support their own work practices, such as marketing and production planning, and in that sense ETHICS could be applied to understanding how the GDS might contribute to the quality of work life of customers. However, given the difficulties of gaining access to customers it is more appropriate to treat the customer's organization as a black box and to assess user satisfaction through an instrument such as WebQual (Barnes & Vidgen, 2001a; Barnes & Vidgen, 2002). WebQual is a questionnaire-based method for assessing the quality of an organization's e-commerce offering in three dimensions: usability, information quality, and interaction (service) quality. The WebQual instrument has been under development since the early part of 1998 and has evolved via a process of iterative refinement in different e-commerce domains, such as Internet bookshops, online auction houses and e-government. The method turns qualitative customer assessments, such as 'I find the site easy to learn to operate' (usability), 'Provides believable information' (information), and 'It feels safe to complete transactions' (interaction), into quantitative metrics that are useful for management decision-making. Typically, the tool allows comparisons to be made between organizations in the same industry or for the same organization over time. As part of the TCS programme the Zenith

main web site was redesigned and WebQual was used to assess the quality of the site before and after the redesign (Barnes & Vidgen, 2001b). A similar assessment is planned for the GDS web site. Where it is inappropriate or too expensive to do a detailed work-study, as may be the case with external customers, the WebQual questionnaire approach is a suitable instrument for the assessment of user satisfaction. Thus, the aim of work design has been broadened from job satisfaction to a more general concern with user satisfaction – e.g. customers and employees – in the e-commerce environment.

Technical design

The physical requirements of the implementation were clear: a database was needed together with some technology to link the database to the web. The project team selected Allaire's ColdFusion server together with Microsoft Access (later upgraded to MS SQLServer) database. Graphical presentation of database query results was achieved using Seagate's Crystal Reports and web site design was accomplished using Macromedia DreamWeaver with Fireworks and Flash for graphics and animation. The choice of platform was driven by a mixture of the technology available on a limited budget and the previous experience of the team members. The budget affected the hosting decision insofar as an ISP (Internet service provider) would be needed since the option of Zenith hosting its own dedicated server, or even cohosting with an ISP, were not viable options.

From a logical design perspective, the GDS started as a relatively straightforward application. The database did not have many tables and the program logic was simple. As the project progressed and more functionality and tables were added the application gained in complexity. It became clear that some structure was needed to manage this complexity. The structure came in the form of a three-tier architecture that allowed database, business logic and presentation layers to be separated out. By building the business logic in Cold Fusion using custom tags it is possible to achieve a pseudo-OO implementation. Unfortunately, the scripting approach to web development does not sit well with OO, which meant that the UML diagrams became less relevant as the design moved from the logical to the physical. However, use was made of UML-style interaction diagrams to model the interaction and flow of web pages.

Possibly the greatest challenge was in the design of the web–user interface. The academic supervisor, a traditional system developer, had little aptitude for this area of development. Fortunately, the TCS associate proved to have a flair for graphics and web aesthetics. If this had not been the case, the project would have had to be supplemented with the skills of a graphic designer. We also found that the best way to learn about web page design and web navigation and flow was to imitate exemplars. For example, the Amazon.com registration and ordering flow proved an excellent template – the Amazon.com web site is consistently rated highly for its ease of use and is also well-known by many users. Taking inspiration from exemplar sites might not be innovative, but it does provide a tried and tested route to follow, as long as proprietary methods, such as Amazon's 'one-click ordering' are not infringed.

REFLECTIONS

In this section the differences between web-based IS development and traditional, pre-Internet development are considered, followed by reflections on the role of methodology in IS development. The outcome of this reflection is a revised Multiview framework for IS development in general.

What's different about IS development for the Internet?

In a review of three companies working in Internet time (Baskerville & Pries-Heje, 2001) used grounded theory to arrive at 10 concepts relevant to IS development for the Internet. Causal chains, driven primarily by 'time pressure' and 'vague requirements', link the concepts. The remaining eight concepts are: 'prototyping', 'release orientation', 'parallel development', 'fixed architecture', 'coding your way out', 'quality is negotiable', 'dependence on good people' and 'need for structure'. These concepts were found to characterize the GDS project well and are now considered in turn. The GDS project was running on Internet time with high expectations of functionality and early and repeated delivery of prototypes. Although the high level aim of the project was clear – to deliver research data online via the Internet – the detailed requirements were rather more vague. For example, how would the research data be packaged, priced and presented to the user in graphical format?

The response to this definitional uncertainty was to build prototypes, which were put together quickly and discarded as necessary. Release orientation allowed a basic system to be delivered ahead of time, with a continuous flow of new releases following on. Parallel development is a basic theme of Multiview; analysis and design are done in parallel, each informing the other, with the traditional waterfall life cycle being considered a restricted special case. Baskerville & Pries-Heje found that all three of their case study organizations adopted a fixed three-tier architecture as a way of dividing work – this architecture was adopted as a way of managing the growing complexity of the GDS application. Coding your way out is a fact of life when working under Internet time and tight timescales – 'hacks' have to be made and documentation is left to catch up later, 'when things are quieter'. The benchmark for quality is customer perceptions, rather than the internally focused perspectives of the product and the software development process. Given the timescale and the small project team, dependence on good people was an absolute requirement. An able associate who is quick to learn was an essential prerequisite to the success of the project. However, it is particularly difficult to predict the learning ability and aptitude of a novice developer and to a rather worrying extent the project was largely dependent on the 'luck of the draw'. With larger projects there might be some resilience to developer variability – with Internet time projects with small numbers of specialized resources (e.g. graphic design, database design) getting the personnel resources wrong has catastrophic implications. Lastly, Baskerville & Pries-Heje identify the need for new structures of IS development teams. This may be the case where there is a traditional systems development department in existence, but in the case of the GDS project the team were working in a green field situation and created working structures and routines as the project unfolded.

Table 1. Stereotypical differences between traditional IS development and Internet projects

Dimension	Traditional IS projects	Internet projects
Strategy	The strategic dimension is abstract	The strategic dimension is tangible and visible and relates closely to business goals
	The strategic dimension is addressed indirectly, through broad notions such as strategic alignment. Often the strategic dimension is not addressed at all	Strategy is addressed directly, particularly for e-commerce projects in which a revenue stream is generated
User	The typical user is an employee	The typical user is a customer who makes payment for goods and services
	Users can be trained and consulted directly. System use might be mandatory	Usage is not mandatory and the customer won't attend training sessions
	User needs can be understood through work studies	User needs can be understood through sales and marketing methods
	Job satisfaction is a key aim	Customer satisfaction is a key aim
Design	The development focus is on the internals of the design: the database, the programmes and an architecture (e.g. three-tier)	The development focus is on the Web site as a visual artefact. The development cycle might start with a mock-up of the user interface
	A prosaic user interface design providing basic usability is sufficient	Graphic design skills and a feel for Web aesthetics are essential

Although the 10 concepts capture the emergent WISDM and our experience on the GDS project well, it is less clear that the concepts really capture the differences between web-based IS development and traditional IS development. If the term 'business urgency' is substituted for the concept 'Internet time' then the 10 concepts have a more general relevance to understanding the IS development process. In situations characterized by time pressure and definitional uncertainty the response of IS developers has long been to adopt a flexible strategy to IS development using techniques such as rapid application development and prototyping. However, there *are* differences between web-based projects and traditional IS development, but these differences are more to do with concrete content than with abstractions (Table 1).

As Internet projects become broader in scope requiring greater integration with front office, back office and legacy IT systems of all sorts, then Internet projects will become yet more difficult to distinguish from traditional IT projects. Traditional IS projects would also benefit from giving more attention to strategy, customers, and design aesthetics and therefore the distinctions in Table 1 should, over time, become less pronounced and ultimately disappear altogether.

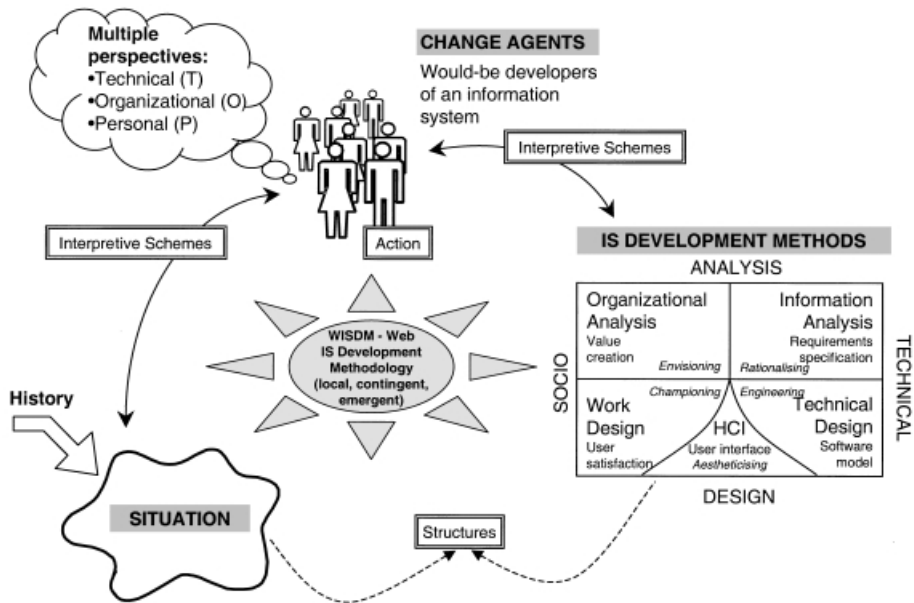


Figure 2. Elaborated Multiview framework for web IS development (WISDM).

Methods and methodology in IS development

The revised Multiview framework for web IS development is shown in Figure 2. The methods matrix in Figure 2 is updated to show the outcomes of the quadrants: value creation as a result of organization analysis, user satisfaction from work design, a requirements specification from information analysis, and a software model from technical design. User satisfaction in the web context includes job satisfaction for the worker and the quality of 'play' for the consumer. A fifth aspect has been added to the four quadrants: Human-computer interface (HCI) design. The user interface dimension was present in the original formulation of Multiview (Avison & Wood-Harper, 1990) and is incorporated Figure 2 to reflect the particular importance of HCI design in a Web environment. HCI design is located in an area overlapping software design and work design as it needs to draw on both.

Each of the aspects in the methods matrix has been annotated to highlight the different emphases that IS development projects are subject to as the developers move around the matrix. Organizational analysis is stereotyped as *envisioning* and creative thinking, information modelling with *rationalizing* and a 'rage for order', work design with *championing* and representing stakeholder interests, technical design with *engineering* and problem solving, and HCI with *aestheticizing* and a notion of design as style. A successful web-based IS project is likely to need a mix of all five aspects, but the mix will vary from project to project, reflecting the contingent nature of the emergent methodology.

Turning to the role of methodology, at the centre of the framework in Figure 2 is the generation of a local and contingent methodology (WISDM), generated through the struggle of the change agents with the situation and the methods. Methodology in this sense is an outcome of action rather than pre-existing, being created and recreated through action and the day-to-day practice of system development.

Although methodology as contingent and locally situated practice might be described as amethodical (Truex *et al.*, 2000), it is not a series of random actions. There are structures that guide and shape the creation of methodology, such as the IS methods and the perceptions of the problem situation in Figure 2. A reading of the Multiview methodology that provides a social theory perspective is Giddens's (1984) structuration theory. In this work Giddens' attempts to reconcile structural and agency views of social theory, what Walsham (1993) refers to as a reconciliation of context (situation) and process (action). Rather than being treated as independent entities, structure and agency are seen as a duality: structure is drawn on in human action, but at the same time structure is produced and reproduced by that action. In the context of IS methodologies, the situation and the methods can both be seen as aspects of structure and are accordingly linked by a dotted line. These structures are drawn on by human actors and contribute to the interpretive schemes that guides practice. Because there are multiple human actors involved in system development there are multiple meanings created as people interpret the IS methods and the problem situation in different ways. We would therefore expect the structures in the mind – methods and situation – to enable and constrain the actions IS developers take while at the same time those actions produce and reproduce those structures. Thus, it is only through the application of a social theory, such as structuration theory, that we can begin to understand how an IS development methodology might emerge through practice.

SUMMARY

The Multiview framework has been used to explain how a web IS development methodology (WISDM) emerged on an e-commerce development project, the Global Drinks Service (GDS), in a UK-based SME. The methods used in the development project reflected the experiences and skills of the developers, the situation, and the type of project. Three key areas where an e-commerce project differs from traditional IS development were identified: a strong and direct link with business strategy, the need to incorporate sales and marketing skills to address the needs of the user as customer, and a bolstering of traditional IS development skills with a graphic design sensibility. Five stereotypical roles in IS development were identified through the methods matrix: envisaging, rationalising, championing, engineering, and aestheticising. The project also gave insights into the nature and role of methodology in IS development, with a Giddensian reading suggesting a shift from a view of methodology as fixed structure to one of methodology as doing and practice.

Future research includes a second 2-year action research project began in October 2001 to create a web-enabled repository of research data for Zenith International. The new project will involve extensive business process redesign for Zenith and is expected to provide a rich setting for further development of WISDM as well as an action research platform for investigating further the role of methodology in IS development. However, although action research is a powerful method for gaining first-hand experience of practice, a shortcoming of this research method is that the researcher can become too involved in the 'doing' and find it difficult to stand back and make sense of the data, i.e. interpretation can suffer (Braa & Vidgen, 1999). Qualitative case studies will be conducted in parallel to explore further the interpretive schemes that developers draw on in practice and to provide triangulation of the action research findings.

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Biography

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