A framework for understanding how a unique and local IS development method emerges in practice

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Abstract

Within the field of information systems development (ISD) most contributions concern formalised development methods and focus either on how they should be or on how they are used. In contrast, this paper explores the relationship between what influences and shapes a unique and local method and how it consequently emerges. Based on a synthesis of prominent IS literature, an analytical framework is developed using three perspectives: (1) the structuralist, (2) the individualist and (3) the interactive process perspective. Each perspective supplies a set of key concepts for conceptual understanding and empirical exploration of method emergence in practice. The analytical framework is applied to a longitudinal case study of method emergence in a web-based ISD project in a case company where the Multi-view methodology was adopted. The case study account is supported by the development and use of a graphical mapping technique, called method emergence mapping for representing the complex interplay between structural elements, human action and the emergent method as it unfolded over time. The contribution of this paper to ISD theory is the development of an analytical framework that can be applied as a lens for explaining how a unique and local method emerges in practice. Also lessons for ISD practice are identified: no 'one' is in control of an ISD project, projects should organise around a vision rather than a fixed plan; and methods should be used as guiding frameworks for action rather than prescriptions.
European Journal of Information Systems (2006) **15,** 225–238.
doi:10.1057/palgrave.ejis.3000593

Keywords: information systems development; methods; emergence; framework

Introduction

In the information systems development (ISD) literature, the concept of method is often used to refer to an orderly, predictable and universally applicable process (Truex *et al.*, 2000, pp. 54). Lyytinen (1987) defines a method as an organised collection of concepts, beliefs, values, and normative principles supported by material resources, while Andersen *et al.* (1990) and Mathiassen (1997) declare that a method consists of prescriptions for performing a certain type of work process with the help of principles, techniques and computer-based tools and is characterised by its application area and its perspective, that is, a set of assumptions on the nature of the work processes and their environment. In line with these definitions, Fitzgerald *et al.* (2002, pp. 13) put forward the term formalised method and define it as any formally documented in-house or commercially available method. This definition also includes computer-aided

software engineering (CASE) tools as a type of formalised method (Fitzgerald *et al.*, 2002).

Most contributions within the field of ISD focus on formalised development methods: the prescriptive literature emphasise how they *should* be used, while empirically grounded writings focus on how they actually *are* used. A number of method authors recommend that the development process should be tailored to fit the contingencies of the particular situation (Avison *et al.*, 1998; Jacobsen *et al.*, 1999). In line with this, empirical studies show that in practice IS developers rarely adopt methods in their entirety, instead they adapt and apply method elements in a pragmatic way (see e.g. Stolterman, 1991, 1992, 1994; Bansler & Bødker, 1993; Fitzgerald, 1997, 1998; Fitzgerald *et al.*, 2002; Madsen & Kautz, 2002). Others argue that the formalised method is just one ingredient among many that influence and shape the actual unfolding development process and situated use of methods – what has been referred to as the unique method (Truex *et al.*, 2000), the local methodology (Vidgen, 2002; Vidgen *et al.*, 2002) or the method-in-action (Fitzgerald *et al.*, 2002).

The notion method-in-action has been introduced by Fitzgerald (1997) and Fitzgerald *et al.* (2002) to account for the relationship and tension between formalised methods and their use in practice, how methods-in-action reflect contextual factors, and how they are uniquely enacted by the developer (Fitzgerald *et al.*, 2002). Without providing a strict definition of the concept Fitzgerald *et al.* (2002, pp. 13) contrast the formalised and the method-in-action and state that 'while some kind of method-in-action will be used, a formalised method may be the basis but is not essential' and illustrate their argument through a number of empirical examples at a broad level. Equally generally, Truex *et al.* (2000) propose that the unique method, while always present, may never even be identified. Both Truex *et al.* (2000) and Fitzgerald *et al.* (2002) stress the importance of understanding the myriad of factors relevant to the ISD context and the effect they have on the development outcome. However, so far little research has addressed the details of how the unique and local method emerges and why it takes the form it does. The purpose of this paper is therefore to contribute to ISD theory and practice by exploring the relationship between *what* influences and shapes the unique method in practice and *how* it emerges.

As our object of study we focus on *the emergent method*, which we define as *the actual unfolding development process and the activities, and applied method elements that comprise this process*. This definition addresses the development process as a sequence of activities (Sambamurthy & Kirsch, 2000). It builds on existing research in formalised methods and their use in practice, but goes beyond the concept of method-in-action as it places more emphasis on what actually happens over time than on the relationship between the prescribed and the actual.

Our choice of the concepts *emergent method*, when we describe and analyse the concrete case under investigation, and *method emergence*, when we relate to the phenomenon on a general level, is inspired by Pettigrew (1987). Studying change processes in firms, he argues that from a more holistic and systemic perspective the language of process is characterised by verb forms such as emerging, elaborating, mobilising, changing, dissolving and transforming, whereas at the level of the individual actor the emphasis is on enacting, acting, reacting, interacting, and adapting (Pettigrew, 1987). Thus, while we take the individual actor into account, we assume a more holistic stand and go beyond this level: we are interested in the unfolding of the actual development process as an outcome of a complex web and interplay of enacting and interacting actors and structures.

The paper is organised as follows. In the next section, our research approach is described and in the third section we develop an analytical framework for understanding method emergence in practice. The framework consists of three perspectives: the structuralist, the individualist and the interactive process perspective, which each supply a set of key concepts for conceptual and empirical appreciation. In section four, the emergent method as it unfolded in the case company is presented and depicted visually with the graphical MEM technique. In section five, the features of the emergent method are reviewed and thoroughly explained through the lens of the analytical framework. Finally, the findings and their implications are discussed in section six and conclusions are drawn in the last section.

Research approach

The research presented in this paper is interpretive. It is based on an empirical case study in the Market Research Company, a UK-based small to medium-sized consultancy, where an in-house web-based ISD project was undertaken. The development project was conducted in order to improve the Market Research Company's internal work practices and to support online sales to its customers by creating a research data repository (RDR) that would contain details of companies and production volumes in the drinks industry. The project started in October 2001 and delivered a first production version of the information system in September 2003. Our research comprises this time period, but takes also further development activities until February 2004 into account.

The roles and length of stay in the field have varied for the three authors of this paper. One author has been involved in the project as an action researcher throughout the 2-year time period. This author was involved in the hands-on development in the early stages of the project and had the title of Academic Supervisor. A second researcher participated as an 'action case' (Braa & Vidgen, 1999) or 'involved' researcher (Walsham, 1995) for 6 months from March to September 2002, contributing primarily to the information analysis activity. A third

researcher acted as an 'outside observer' (Walsham, 1995) and conducted interviews with employees of the case organisation, as well as with the action researcher and the involved researcher. The interviews were carried out in November 2002. The combination of intervention, interpretation, and collaboration between three academic researchers with different levels of involvement was chosen to bring interpretive rigour to the project. This design counters a specific criticism of action research, which puts forward that it may be little more than consultancy (Baskerville & Wood-Harper, 1996).

The formal project organisation of the RDR project required quarterly steering committee and monthly technical meetings. During these meetings both the action researcher and the involved researcher captured data by taking hand-written notes, and as soon as possible after the meeting, the written notes and as many details as possible were recorded in two separate and personal project diaries. For each diary entry, the date, participants, location, and events as well as immediate interpretations and personal comments were logged. Furthermore, a variety of documents such as the original project proposal, minutes of steering committee and technical meetings, company documents as well as project reports and deliverables were collected. In addition, the study draws on the third researcher's independent analysis of the two project diaries and seven semi-structured, tape-recorded and transcribed interviews performed with five project participants, that is, the Company Chairman, the Market Research Director, the Developer, the Academic Supervisor and the Involved Researcher, and two future end users, that is, two Market Researchers.

In line with the research topic and the interpretive approach, our understanding of method emergence has come about through an iterative process of interpretation, comparison and interlacing of prior research and empirical data. The arguments for and choice of the theories and approaches that constitute the analytical framework are therefore equally informed by both literature and practice, by deduction as well as induction.

The analytical framework
In this section, we develop an analytical framework for understanding method emergence in practice. The framework will be used to structure and perform a detailed analysis of the Market Research Company case.

The ISD literature reveals a lack of cumulative frameworks that integrate the theoretical and empirical findings from the many existing studies about ISD and ISD methods in practice. Notable exceptions are: the NIMSAD framework which is based on both theory and practice and can be used to select and evaluate primarily formalised methods (Jayaratna, 1994); the social action model of situated IS design, which was derived from a case study of a practical design process (Gasson, 1999); an integrative framework of the information system development process developed from a literature study

(Sambamurthy & Kirsch, 2000); and the method-in-action framework that incorporates past and contemporary thinking and empirical findings about ISD methods into one conceptual frame (Fitzgerald *et al.*, 2002). Common to these frameworks is that they stress the importance of understanding the context, the formalised method(s), the developers' preconceptions and actions and their interactions with other stakeholders, as well as the influence that these concepts have on the ISD process. Our work builds on the insight provided by these frameworks and models. We use similar concepts and share similar assumptions about their inter-relations. However, our framework extends the line of thinking by providing more, and more comprehensive constructs and a clear and strong focus on the temporal dimension of the development process to support analysis. The increased emphasis on *detail* and *sequence* concerns the object of study, which addresses the emergent method as a sequence of activities that unfold over time.

For the analytical framework we draw on three perspectives: the structuralist, the individualist and the interactive process perspectives delineated and originally used by Slappendel (1996) to analyse research on innovations in organisations. Markus & Robey (1988) apply similar perspectives in their work on causal structure in theory and practice, and Kautz & Nielsen (2004) use the framework as a basis for for understanding Software Process Improvement in practice. Kautz (2004) also applied it to study the actual use of a method in a systems development project. The three perspectives provide a frame for focusing on structural characteristics, individual action, and the complex and dynamic interplay between socially constructed structure and purposeful human action over time (Slappendel, 1996; Kautz, 2004; Kautz & Nielsen, 2004). Addressing one of the major discussions in the social sciences and IS, namely that of structure and agency (see e.g. Rose *et al.*, 2005), Slappendel's framework has a general relevance and has already shown its suitability for ISD and ISD research.

We have further developed and refined the elements constituting the three perspectives to combine and integrate existing contributions from, or previously used in, the field of ISD into a coherent framework for understanding *what* influences and shapes the emergent method in practice.

From the *structuralist perspective*, structural characteristics influence and shape the emergent method. The perspective is inspired by the concepts in Fitzgerald *et al.*'s (2002) method-in-action framework and their main tenet that contextual factors and elements, the developers, and the information system under development as well as the formalised method and the rational and political roles it plays all affect and mould the method-in-action (Fitzgerald *et al.*, 2002). We take the structuralist perspective to comprise a focus on the key concepts of: *context, developers, information system* and *formalised method* and their structural characteristics. These concepts introduce the particular development setting, the

project under study and allow for an understanding of how certain structural characteristics affect the emergent method. The emphasis is on descriptive and static characteristics, and the structuralist perspective does not as such address the impact of the individual developers' actions or of the interaction between structure and individual action over time.

Within the *individualist perspective*, the actions of the individual IS developers are seen to influence and shape the emergent method. The perspective is inspired by Schön's concept of the reflective practitioner (Schön, 1983) and his notion that the practitioner uses his entire repertoire of prior knowledge, language and media to engage in a reflective conversation with the particular situation. The individualist view draws on Schön (1983) to suggest that the individual developer's repertoire of prior methodical and practical knowledge, language and media preferences shape his actions and that these actions in turn influence the emergent method. As such, the individualist perspective does not adhere to the traditional perspective on method, that is, as something which is applied in a straight-forward and easily observable way, but it also goes against the abandonment of the concept of method as a whole, as might be put forward by the proponents of tinkering, improvisation and amethodical ISD (see e.g. Baskerville *et al.*, 1992; Ciborra, 1998, 1999; Truex *et al.*, 2000). The key concepts of the individualist perspective are: *repertoire, language* and *media*. These concepts allow for an in-depth understanding of the individual developers and their influence on the emergent method, but lack a focus on the emerging method as an inherently social change process, which may also be influenced and moulded by the actions of many other involved or affected actors and organisations.

The *interactive process perspective* is based on the assumption that the emergent method comes about over time through the interaction between structural influences, the actions of individuals and the content of change, that is, the emergent method and information system under development. The perspective builds on and supplements the structuralist and the individualist perspectives through a focus on the key concepts of *social context*, *social process* and *content of change* (Walsham, 1993) as inter-linked units of analysis (Pettigrew, 1987; Kautz, 2004; Kautz & Nielsen, 2004). Social context addresses social relations, infrastructure and the history of previous procedures, structures and commitments (Walsham, 1993). Social process focuses on the political (i.e. the distribution of power and balance between autonomy and control) and the cultural (i.e. sub-cultures and the interaction between sub-cultures) aspects of ISD (Walsham, 1993). Content of change refers to how the planned and actual development process and the product of change (Kautz & Nielsen, 2004) emerge in interaction with the social context and social process. Thus, the interactive process perspective allows for an understanding of the development process as a complex, dynamic

and social process of change, in which political and cultural aspects play a central role.

The three perspectives constitute a narrative and analytical structure that proceeds from introducing the case through a focus on structural characteristics, over understanding the individual developers' backgrounds and actions, to a full appreciation of the complex interaction between all involved actors and structures. It provides the sequence for presenting and supporting the understanding of the emergent method.

The formalised method and its unfolding in practice: the emergent method

The contingency approach Multiview/WISDM (Vidgen *et al.*, 2002) was chosen as the overall methodical structure for the RDR development project. Multiview/WISDM is based on the original Multiview Methodology (Avison & Wood-Harper, 1990; Avison *et al.*, 1998), but it has been adapted to web development by including methods and techniques that address issues related to the web-based user interface and user/customer satisfaction.

Multiview/WISDM offers a framework for web-based ISD that facilitates the construction of a situation-specific method. It is based on the assumption that a locally situated method is emerging throughout the process as a result of the IS developers' engagement with the particular problem situation. This engagement informs the choice of formalised methods and techniques from the Multiview/WISDM method matrix (Figure 1) and provides a practical basis to perform development activities in order to improve the problem situation (Vidgen *et al.*, 2002).

The method matrix (Figure 1) comprises a collection of formalised methods and techniques organised according to five different aspects of ISD. It aims to support a socio-technical approach to ISD by including methods that emphasise design and construction of technical artefacts as well as methods that address the social and contextual aspects of ISD (Vidgen, 2002). The archetypical methods in the matrix are soft systems methodology (SSM, Checkland & Scholes, 1990) for organisational analysis, the unified modelling language (UML, Booch *et al.*, 1999) for information analysis and technical design, ETHICS (Mumford, 1995) for work design, and web usability
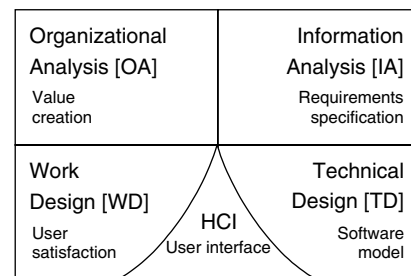
Figure 1   The Multiview/WISDM methods matrix (Vidgen *et al.*, 2002).

(Nielsen, 2000) for the human–computer interface. However, Multiview/WISDM is not supported by a pre-specified process model. Instead the method authors suggest that the focus of attention changes during the process as the developers zoom in and out of the five aspects of the method matrix and that while one aspect might be the focus of attention at a particular time, the other aspects can still be present in the minds of the developers (Vidgen *et al.*, 2002).

The actual development process under investigation here unfolded over a period of more than $2\frac{1}{2}$ years and consisted of 13 key activities. Table 2 shows the sequence and duration of activities, for each development activity the start and end times of the activity are given together with an activity number and a brief description. Longitudinal process research generates large quantities of data (Langley & Truax, 1994) and the presentation of the emergent method in Table 2 is, of course, a simplified presentation of the project; a severe condensing of interviews, research diaries, and project documents, and so on. Table 2 does thus not discern a pattern to the unfolding of the emergent method. For such cases visual displays have been recognised as very useful (Miles & Huberman, 1984). In Figure 3 we therefore present the complex interaction between structural elements, the involved human actors and the emerging method graphically with a technique, the method emergence mapping (MEM) technique (Vidgen *et al.*, 2004), which has been developed for this purpose.

The notation used in Figure 3 is explained in detail in Figure 2. It takes elements from Langley & Truax's (1994) process flow chart and Thorp's (1998) results chain modelling and extends them into a graphical notation that supports a process language that is used to depict the unfolding of the emergent method. The process language is designed to support the analytical framework used in this paper and the resulting method emergence map is itself one of the inputs to the analysis. The activity numbers, which identified the key activities in Table 2, are also used in the method emergence map and later in section 5 to cross-reference to specific development activities.

Hexagons represent motivating beliefs held by individual project team members and are therefore related to the *individualist perspective* (see Table 1). Ovals represent things of significance that were outside the control of the project team, but which can be understood in terms of the social context and social process, and hence, ovals are related to the *interactive process perspective* (see Table 1). The *structuralist perspective* (see Table 1) is represented by the solid arrow labelled 'pre-existing structures' in Figure 2, activity number 0, thus reflecting the essentially static nature of this perspective.

From the initiatives and outcomes in Figure 3 it is possible to identify the major phases that emerged in the project: exploration; database development; investigation of business process and job satisfaction; design of
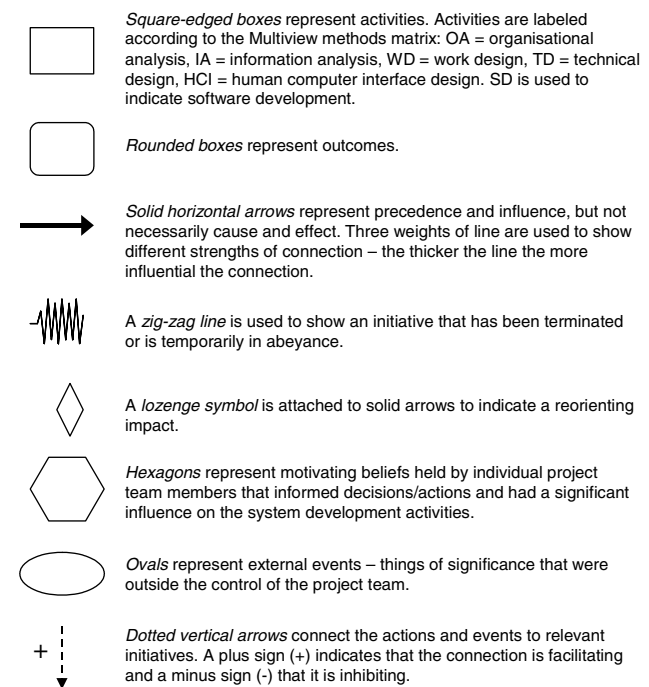

Figure 2 The method emergence mapping notation.

Table 1 The analytical framework

| Object of study/three perspectives	Key concepts
Object of study	*The emergent method* – the actual unfolding development process and the activities, and applied method elements that constitute this process
Structuralist (structural characteristics)	*Structural context, developers, information system, formalised method* – characteristics hereof influence and shape the emergent method
Individualist (individual action)	*Repertoire, language, media* – influence and shape the individual developer's actions, which in turn influence the emergent method
Interactive process (structure, action and the issue of time)	*Social context* – social relations, infrastructure and the history of previous procedures, structures and commitments influence and shape the emergent method
	Social process – political and cultural aspects of ISD influence and shape the emerging method
	Content of change – the planned and the actual method and information system emerge in interaction with the social context and social process
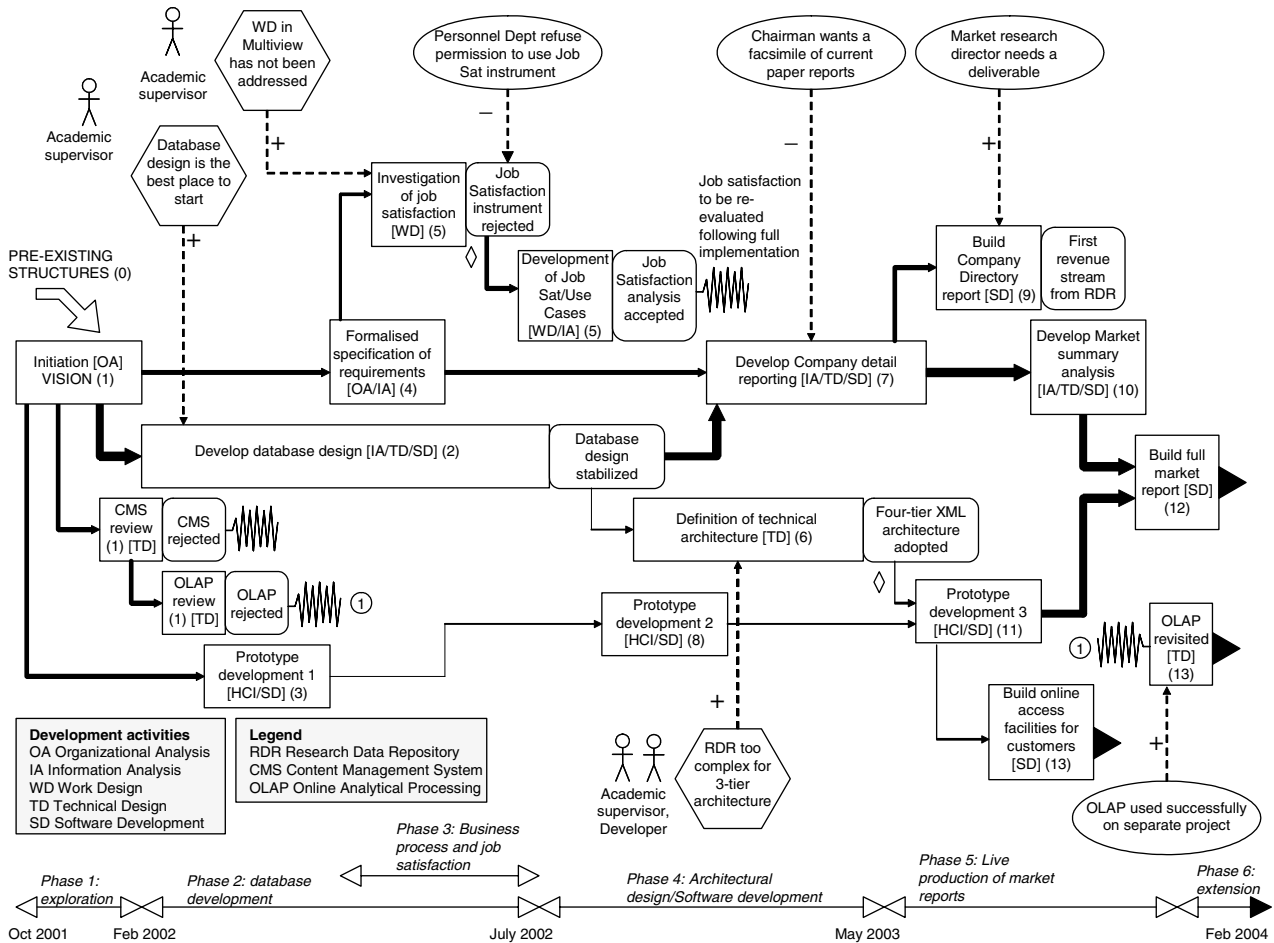
Figure 3   Method emergence map (MEM) for the RDR project.

software architecture and development of core operational software; live use of software to produce market reports; extension of software (e.g., provision of Internet access for by clients to RDR). The phases as well as the explicit connections between the key activities and the Multiview framework were only identifiable with the benefit of hindsight, that is, as a result of the textualisation and MEM exercise. During development – that is during the flow of events – the emergent method was only partially identified (cf. Truex *et al.*, 2000). Moreover, in keeping with Walz *et al.*'s (1993) observations, even though the traditional activities of ISD such as requirements analysis and design were undertaken in the RDR project, they were not performed according to the traditional methodical sequence, they were not independent of each other, and they did not have a clear start and end.

An analysis of the emergent method
Now, we analyse the elements and interactions that contributed to the method emergence with the aim of providing an explanation of why the emergent method took the form that it did. The following three sections

emphasise different aspects of the case according to the structuralist, the individualist, and the interactive process perspective and their key concepts, with reference to the development activities shown in Table 2 and Figure 3, respectively.

The structuralist perspective
The setting for the RDR project was the market research department, which consists of six full-time employees, including the Market Research Director. Each year the department produces a number of market reports, with the two most important ones being the 'Bottled Water' and 'Water Coolers' reports. The reports are based on data gathered from as many companies as possible in a line of business, such as bottled water. The reports are then sold to companies in the drinks industry, such as manufacturers (who provided the original detail data), packagers, and distributors. From initiation to publication, each report takes around 3–4 months to produce. Each report is led by a single market researcher who does the bulk of the work and gains a deep insight into the data and manages the structure of the report. A large volume of data has to be collected, stored, processed and

Table 2 Emergent method for the RDR project

Elapsed time	Activity No.	Activity
October 2001–January 2002	1	*Initiation*: newly employed Developer trained in technology used by Market Research Company. The review of the content management (CMS) and the online analytical processing (OLAP) software conducted leads to decision to custom build software.
February 2002–July 2002	2	*Database design*: the database is recognised as core to RDR. The plan allowed for six weeks elapsed time to design database on the assumption that a CMS would be implemented – due to the complexity of the RDR data structures analysis and design took five months to reach a stabilised database.
April 2002–May 2002	3	*Prototype development 1*: an early prototype was developed to provide the users with a tangible output, allowing feedback on look and feel and a first test of the database structure.
May 2002–June 2002	4	*Formalised specification of requirements*: the informal notes and analysis of business processes were written up using flow charts and UML use cases.
July 2002	5	*Investigation of job satisfaction*: application of the Multiview framework suggested that attention be given to job satisfaction of market researchers. The ETHICS questionnaire was rejected by the Human resources manager in the personnel department; A revised questionnaire combining job satisfaction and use cases was developed and this highlighted that users felt they spent too much time collecting and formatting market data as opposed to analysing, summarising and commenting.
August 2002–December 2002	6	*Technical architecture design*: the original three-tier architecture was superseded by a four-tier architecture based on XML. This was a response to the complexity of the RDR application and the desire to build a flexible platform for data sharing.
September 2002–January 2003	7	*Development of company detail reporting*: the emphasis of the project was on Web delivery, but the Company Chairman wanted the RDR to produce an exact facsimile of the current paper reports. This required the introduction of a more sophisticated formatting technology, XML-FO (formatting objects), to deal with page headers, page breaks, etc. for output in PDF format.
January 2003–February 2003	8	*Prototype development 2*: the Market Research Director needed and demanded a deliverable from the RDR project to sustain interest and credibility within company. If company detail data were entered into the database then a directory of companies in the water cooler industry could be generated. To support data entry of company detail data the user interface was redeveloped.
March 2003–May 2003	9	*Company directory reporting*: company detail data entered into the database, the water cooler directory report produced automatically in PDF format, and marketed and sold to clients.
June 2003–July 2003	10	*Market summary analysis*: detailed company volume data summarised into market overviews (e.g., top 50 bottled water companies in Europe).
July 2003–September 2003	11	*Prototype development 3*: testing of interface with users identifies extensive modification needed to support needs of market researchers in the production of live reports. Some rewriting of code needed to support an XML based four-tier architecture.
October 2003–January 2004	12	*Market report production*: the first full market report, West Europe Bottled Water, is produced using the RDR.
February 2004 onward	13	*Extension*: further reports produced from the RDR, new technologies explored (e.g., online analytical processing – OLAP), external access for clients via the Internet, and new business initiatives (e.g., sales data pooling) launched.

formatted and information overload is the norm: 'We've got loads of information on paper, on Excel files, all floating around' (Market researcher, interview quote, November 2002).

The RDR project was undertaken as in-house development by a relative small project organisation, where the steering committee involved 6–8 people and the project team consisted of 3–4 people with one full-time Developer and the others being involved in the actual development activities to varying degrees. The project concerned the development of a technically complex web-based information system. It was performed collaboratively by the Market Research Company and Bath University within the Teaching Company Scheme (TCS, a government funded programme that promotes collaboration between industry and university) and involved the active participation of academic researchers. The active involvement of academic researchers in the formal project organisation and the developers' high level of methodical knowledge and their practical experience explain the choice of the framework Multiview/WISDM as the overall methodical structure and provided a ground for the emergence of the local method throughout the process.

The Market Research Company had already used the combination of Microsoft SQLServer and Macromedia ColdFusion, a high-level Web development language, to implement an interactive Web site (for full details see Vidgen, 2002). Given the availability of this software within the company, a lack of resource to acquire further expensive software platforms, and the previous experience of the RDR team with this technology the context

dictated that there would need to be compelling reasons for not using this combination on the RDR project. As the project unfolded additional software was needed to create XML documents suitable for printing to paper, but this software acquisition cost was relatively insignificant. The focus on database modelling led the project team to identify the need for computer-aided systems engineering (CASE) support. The RDR team reviewed a range of CASE and diagramming tools, including Microsoft's Visio Professional, before settling on the ERwin data modeller from Computer Associates. ERwin is a top-end database design tool that integrates fully with the target database, Microsoft SQLServer. Bundled with ERwin were UML modelling tools that were used for the production of use case diagrams. In this context, CASE tools were used in an instrumental way, that is, to support the agreed approach to analysis and design for the RDR rather than being part of a broader programme of organisational change in the IS development process (Orlikowski, 1993). Prototyping of the user interface was done using Macromedia's ColdFusion, with the benefit that the same programming environment was used for prototyping and production.

Before project initiation, Multiview/WISDM was used to inform the construction of a situation-specific method outlined in the form of a detailed project plan (i.e. the planned method), which was included in the original project proposal (i.e. TCS project proposal) and formally approved by the TCS programme. However, during development, the planned method was not enforced. As the Academic Supervisor explains: 'We don't sit on a plan and say what's in the plan and then just follow through' (Academic Supervisor, interview quote, November 2002). Instead, the project plan was updated at quarterly intervals to reflect what had already taken place. Thus, rather than following the pre-planned method, the actual method emerged as a time-boxed prototype driven approach, where techniques such as E/R (entity-relationship) diagramming, use cases, flow charts, think 'aloud' tests and a job satisfaction survey were chosen and used at the discretion of the project team, when and as they thought it relevant during the course of the project. In this continuous process of situated method emergence, Multiview/WISDM played a role as an individual 'framework for thinking', but also as an explicit structure that was used to inform the project team's choice of the job satisfaction survey.

I think that [the Academic Supervisor] used Multiview/WISDM and I think that I also used Multiview/WISDM … not as an

Table 3   The structuralist perspective

Elements	Characteristics	Influence on emergent method (development activities)
Structural context	In-house development; Small project organisation (6–8 people involved, 3–4 people in the project team); Joint university – company collaboration within the Teaching Company Scheme (TCS)	The involvement of academic researchers explains choice of Multiview/WISDM and the application of a job satisfaction survey (0, 5) TCS specified the project duration and the project organisation (0) The choice of target technology platform was influenced directly by team member experience and availability of software in the company (Microsoft SQLServer and Macromedia ColdFusion) (0)
Developers	Long formal educations, from 0–15 years of practical experience	The high level of methodical knowledge and practical experience explains the choice of Multiview/WISDM framework (0) and provides the ground for the emergence of the local method throughout the process (1–13)
Information system	Technically complex web-based system	Emphasis on database modelling, back-end functionality and systems architecture (2, 6)
Formalised method	Multiview/WISDM framework supports the choice of formalised methods and techniques; no pre-specified process model supplied	Before project initiation, Multiview/WISDM was used to inform the construction of a situation-specific method, manifested in the form of a project plan (0) During development, the project plan (i.e. the planned method) was not enforced, but updated at intervals to reflect what had happened (i.e. the actual method: 1–13) During development, Multiview/WISDM was used as an individual 'framework for thinking' and to inform the choice of a job satisfaction survey (0, 5) The perceived complexity of the database structure led to the adoption of the ERwin CASE tool (1, 2)

explicit framework … saying this is what the model says, now we are going to do this. It was more like, I'm sure [the Academic Supervisor] just had it in mind, thinking we have to do the technical design, we have to do the information analysis and the same thing for me. It was more just a framework for thinking…' (Involved Researcher, interview quote, November 2002).

Table 3 shows which and how structural characteristics influenced and shaped the emergent method. The structuralist perspective on the Market Research Company case provides valuable insight into the case study setting, the project under study and the choice and use of Multiview/WISDM. However, the descriptive characteristics do not in themselves explain why the project team chose a prototyping approach, why the prototypes were conceptualised, scoped and developed as they were or why data modelling was chosen as the critical point of departure. This is examined in more detail from the individualist and interactive process perspective.

The individualist perspective
Together, the project team members' repertoire of prior knowledge explains the choice of methods and techniques. Especially, the Academic Supervisor's background played a significant role in shaping the emergent method. His way of thinking about and taking action in the RDR project were influenced by (1) his knowledge of ISD methods in general, and Multiview/WISDM in particular as one of the method authors hereof, (2) his preconceptions of and practical experience with ISD, that is, he favours tangible prototyping results as well as a data and technology driven approach, and by (3) his knowledge about the Market Research Company, the cyclic nature of the report production processes, the paper-based reports and the amount of data they contain.

'I had it very clear in my mind. There was no doubt that we had to start by getting the database structure right, because my approach to systems development is data driven and really when you looked at the output of the [market] research process, at the [paper-based market] report, you know that you have to add a whole lot of data' (Academic Supervisor, interview quote, November 2002).

The full-time Developer had little prior practical experience and relied on the guidance by the Academic Supervisor, whereas a third developer, who was temporarily involved in the project, favoured process modelling and requirements specification.

As such, the RDR team members' and especially the Academic Supervisor's background allows for an understanding of why a prototyping approach was chosen and used as the dominant method, why data modelling and the database model were considered the natural starting point and critical success factor and why other analysis and design activities were 'squeezed in' or performed in parallel with the prototype development. The project team members' background also explains the choice and use of the already mentioned analysis and design techniques. The project team members' background and even more so their media preferences for code and spoken language further explicate why the only document that was frequently revisited and used throughout the development process was the E/R diagram. Other documents, such as the written project plan and the requirements specification, were used marginally and infrequently, if at all. The written project plan was updated right before steering committee meetings and not otherwise used, and while the requirements specification shaped and explicated the project team members' understanding of the RDR application at the specific moment in time in which the analysis was conducted,

Table 4 The individualist perspective

Elements	Project team	Influence on emergent method (development activities)
Repertoire and language	Project team members repertoire and language shaped by: • Academic Supervisor: prototyping, data modelling and technology • Developer: no practical experience, guided by the Academic Supervisor. Involved researcher: requirements specification and process modelling	Together the project team members' and in particular the Academic Supervisor's background explains the choice and use of prototyping as dominant method to develop the information system (0, 2, 3, 7, 8, 9, 10, 11, 12) Together the project team members' background explains the sequence of the unfolding development process, where prototyping was dominant in time and effort (2, 3, 7, 8, 9, 10, 11, 12) with analysis activities 'squeezed in' or performed in parallel (2, 4, 5) Together the project team members' background explains the choice and use of analysis techniques, that is E/R diagramming, use cases, flow charts, job satisfaction survey and think aloud tests (2, 4, 5)
Media preferences	Little use of written documents to control and perform the work	The E/R diagram was used throughout the process (2) and its importance is underlined by the adoption of the ERwin CASE tool; Other planning, analysis and design documents were only marginally used and maintained once developed (4, 5, 6)
	Preference for code and spoken language as medium for reflection-in-action	The project team members media preferences explain the choice of and extensive reliance on prototype-driven software development (2, 3, 7, 8, 9, 10, 11, 12)

the project team quickly moved forward without attempting to keep the specification updated in accordance with new discoveries, decisions and events. Table 4 provides an overview of how the individual developers' repertoire of knowledge, language and media preferences influenced and shaped the emergent method.

The interactive process perspective

When the RDR project commenced, the social context was already well-established and structured. It had been shaped by long-term, trust-based social relations and the existing social infrastructure between company management and the Academic Supervisor. Management and the Academic Supervisor shared an understanding of the project vision, the appropriate development approach, the information technology to be used and the required project organisation specified by the TCS. This social context also influenced the political aspects of the project so that the distribution of power was in favour of company management and the Academic Supervisor.

The project vision and development approach were defined by management and Academic Supervisor and management influenced the emergent method through participation in steering committee meetings and daily contact with Developer. Furthermore, the Academic Supervisor had extensive influence through his role as project manager, hands-on developer and supervisor for the Developer. The Developer had discretion in daily work, but was strongly influenced by management and the Academic Supervisor. Thus, the social process and its content, that is, the emerging process and the RDR application, were guided by the actions of the influential company management and the Academic Supervisor as well as the significant meaning that they and the market research department assigned to the paper-based market reports and the market report production process. The paper-based reports were consequently used first to evaluate and discard commercially available web content management systems. Subsequently, they were utilised as direct specifications for the RDR application's custom-build database model and reporting facilities and the report production process was used to divide the development process into prototypes and formalised requirements specification.

Moreover, the project team drew on their understanding of the report production process to conceptualise, verbalise and scope the emerging development process and prototypes. The social process was further shaped by the formal project organisation, which consisted of representatives from different sub-cultures, each with their own views and interests, but also with the shared goal of developing an information system. The company management's strategic concerns meant that the RDR application was developed to produce paper-based reports and not just on-line delivery of market data; the involvement of academic researchers meant that a socio-technical job satisfaction survey was performed; while TCS participation meant that the project plan was

brought up to date before the quarterly steering committee meetings. The interaction between the sub-cultures was facilitated by the formal project organisation and informal dialogue. Within the project team, techniques such as E/R diagramming, use cases and flow charts were used to engage in a reflective conversation with the situation and with each other. However, the project team preferred to use working prototypes and spoken dialogue when interacting with the other stakeholder groups. Therefore, textual descriptions and graphic representations were used very little outside the boundaries of the project team. Throughout this process and within this context a custom-made information system with a focus on supporting the internal production process, which implemented a paper-based report with a possibility of running online queries, was put into operation.

The original plan had been to build the system through a prototyping process supported by CMS and OLAP software based on the bottled water and water cooler reports as point of departure. The focus was on a web-based front-end and business process redesign, both of which would lead to consequent organisational changes. The emergent method was broadly similar in that it still relied on prototyping, but the reports now served as specifications and their production process was used to envision the prototypes. Rather than use CMS/OLAP software the project used the Erwin CASE tool to focus on database modelling, which in turn led to a need for a sophisticated systems architecture. Table 5 presents the influence of the social context, social process and content of change on the emergent method.

Discussion and implications

On first inspection, the RDR application development could have been seen as a straightforward exercise: the automation of pre-existing paper-based market reports. That is, the requirements looked to be clear in terms of data structures, which were given by the paper reports, and in terms of process, which seemed to be a relatively simple exercise in data input, processing, and output. In practice this was not the case. The application of the analytical framework led to a deep appreciation of the Market Research Company case, where (1) structural characteristics helped explain the choice of and extent to which the formalised method Multiview/WISDM was used, (2) the individual project team members' repertoire of prior knowledge, language and media preferences helped explain the selection of and sequence in which method elements were pasted together to form the unique method, while (3) the focus on the interactive process facilitated identification of the structural elements and influential actors that played a major role in shaping the resulting information system and the emergent method over time. The three perspectives provide different types of insight yet they complement rather than exclude each other, thereby allowing for an in-depth understanding of method emergence in practice. We propose that the analytical framework developed

Table 5   The interactive process perspective

Elements	Characteristics	Influence on emergent method (development activities)
Social context		
Social relations	Long-term social relations between management and Academic Supervisor; Have previously worked together in a similar TCS project	Management and Academic Supervisor defined the project and its boundaries through decisions about project vision, development approach and technology (0, 1)
		TCS-specified formal project organisation, thereby shaping the social relations and rules of interaction (0)
Infrastructure	Social infrastructure characterised by involved management and Academic Supervisor	Shared understanding of company, project vision and established work practices passed on from management and Academic Supervisor to newly employed Developer (1)
History	Management and Academic Supervisors' long-term relation	Shared understanding of what (vision) and how (project organisation and work practices) to develop (1)
	Market research department defines itself in terms of the paper-based reports and report production process; two market reports chosen for implementation	Paper-based reports used as direct specification for data model and automatically formatted reporting (2, 6)
		Report production process used to divide the development process into prototypes and formalised requirements specification (4)
Social process		
Politics	Power distribution in favour of management and Academic Supervisor	Project vision and development approach defined by management and Academic Supervisor (1)
		Management influenced emergent method through participation in steering committee meetings and daily contact with Developer (1–13) The Academic Supervisor had extensive influence through his role as project manager, hands-on developer and supervisor for the Developer (1–13)
		The Developer had discretion in daily work, but was strongly influenced by management and Academic Supervisor (1–13)
Culture	A number of sub cultures involved; sub-culture interaction mediated by formal project organisation and informal dialogue	Management interests in tactical and strategic benefits led to the production of paper-based reports and online delivery of market data (9); The Academic researchers' interests in academic results led to the job satisfaction survey (5); Teaching Company Scheme interests in knowledge development and exchange led to regular updates of the project plan
		Methods and techniques used for reflective interaction within project team; The project team relied on prototyped and spoken dialogue; Little use of methods and techniques at steering committee meetings
Content of change		
RDR application	Planned: Based on web CMS; Focus on both internal process and external sale; Online delivery	Performed: Custom-made; Focus on internal process; Implementation of paper-based report with possibility of running online queries (1, 7)
Emergent method	Planned: Bottled water and water cooler reports as point of departure; Focus on web front-end and organisational change; Prototyping based on CMS and OLAP software	Performed: Bottled water and water cooler reports as specification; Report production process used to envision process and future prototypes; Focus on DB modelling, back-end functionality and systems architecture; Prototyping based on ERwin CASE tool (2, 3, 6, 7, 8, 9, 10, 11, 12)

and demonstrated in this paper is relevant for both ISD practice and research.

In practice, the framework can be used for (1) planning the emergence of the unique and local method through anticipation of potential opportunities and obstacles, which structural characteristics, individual developers and the interactive process might represent in the given situation, (2) for coping with the interactive process

during development and (3) for after-the-fact reflection and collection of lessons learnt.

For the researcher, the analytical framework can be used to perform, analyse, present and compare long-itudinal case studies of how the method emerges in practice and over time. As Checkland (1991) points out, the complexity of practice is such that an explicit framework of ideas is necessary as a vehicle for data collection and identification of important research find-ings. In line with Schön (1983), we argue that detailed studies of practice and subsequent formulation of empirically grounded theories serve to enhance the researcher's and the practitioner's repertoire of knowl-edge and introduce new concepts and distinctions into the language they bring to their practice. This in turn will cultivate their ability to pay attention to and act in accordance with the myriad of characteristics, actors and events that shape the unique and emerging method in practice. We acknowledge that knowledge gained through case studies might not be formally generalisable, but, in line with Flyberg (1992), we argue that this does not mean that it does not contribute to the collective body of knowledge, both academic and practical, of a discipline. Thus, we propose that unique cases and abstracted theories, frameworks and concepts concerned with the relationship between the 'whats' and 'hows' of method emergence allow researchers – and practitioners – to build up a repertoire of knowledge about what can be expected in practice and what can be done to cope with the situation. Such contributions – whether prima-rily about the unique, the abstract, or both – will instil a vigilance and capacity for problem spotting as well as problem solving.

The application of the analytical framework has, however, not been entirely unproblematic. It has been complicated to determine what falls into each of the perspectives and to decide on clear-cut distinc-tions between certain concepts, such as between context and social context, between developer characteristics and their repertoire of knowledge, language and media, and between social context and social process. Yet, as the emphasis lies on understanding the interplay and influence of structures, activities, and events, such difficulties seem less significant. The analytical frame-work's ultimate strength is the way in which it facilitates a focus on the complexity of relationships that are often viewed much more simplistically. In the main stream ISD literature it is, for example, still commonly assumed that the formalised method is applied in a straightforward manner, consciously adapted according to pre-estab-lished contingency criteria, and that the IS developer is or should be able to control the development process (Truex *et al*., 2000).

The unfolding of the project sheds light on the theory and practice of control, as in fact no 'one' in the RDR project was in ultimate control. Traditionally being 'in control' as a manager or developer means selecting, designing, planning a course of action, correc-ting deviation, working in a stable environment with regular patterns, conformity, and consensus forming; while 'not in control' means being in an unstable and unpredictable environment with diversity and con-flict where action is evoked, provoked, emerging, ampli-fying deviation (Streatfield, 2001). Rather than consent to one or other of these poles IS managers and deve-lopers should accept and even embrace the paradox of control, that is, they are simultaneously 'in control' and 'not in control' and need the courage to live with the resulting anxiety. This view of control as emergent describes well the experience of the RDR project. On a day to day basis much of the control was in the hands of the Developer, but there were also strong hierarchical influences from the Academic Supervisor concerning the development method elements and the technology, and from management with regard to business issues. Furthermore, the mix of control changed over time as the Developer gained technical skills and confidence in her abilities. Thus, in a traditional managerial sense it is difficult to say, who was in control of this project; control was an emergent property and an outcome rather than a causal input and was treated as such.

The research also underlines the importance for ISD projects to have a clearly articulated vision that is couched in terms of the value to be created for the organisation (Vidgen *et al*., 2004). Highsmith (2000) calls this the project mission – 'anything that helps the project team define the desired results of the effort at a summary level' (p. 44). Success is then judged on the basis of how well the vision is achieved, not by how well the plan was implemented. With regard to the RDR project, the project description on the cover page of the project proposal gave a clear statement of the vision:

> *'To create an enterprise repository for [Market Research Com-pany]'s research data, using a web content management software solution, to support internal knowledge development and external sales of research data.' (TCS Project Proposal).*

This vision remained constant throughout the project, because it had a strong focus on 'what' was to be achieved in broad terms, and it provided a sense of direction whenever there was a danger of the project drifting or becoming mired in technical issues. However, by includ-ing a statement of 'how' this would be achieved, that is, through the use of content management software, which actually was rejected in the course of the project, the clarity of the vision and its potential as a governing means was weakened.

Organising around a vision emphasises the need for an IS project to be guided toward a desirable outcome rather than the blind pursuit of a planned result. As such, the case analysis also reinforces the value of the Multiview framework as an aid to guiding the deve-lopment process and influencing mental models rather than a prescription (Vidgen *et al*., 2004). Without

a guiding framework it is quite likely that the socio-technical aspect of systems development, for example, which was taken into account by investigating the market researchers' job satisfaction with an instrument combing a questionnaire with use cases, would have been neglected.

Conclusion

In this paper, we have developed an analytical framework to help explain how a situated method emerges in practice. The analytical framework is supported by the MEM technique that helps a researcher describe succinctly the unfolding of the method over time. The analysis of the case shows the great extent to which past history and on-going events influence and shape the emergent method, that is, history matters (North, 1990). Pre-existing structures, such as project characteristics, the individual team members' prior experiences and assumptions, and social relationships create the contours of the landscape within which the situated method emerges in an only partly predictable way. Such structures and the path dependence they induce should not be ignored. The analytical framework presented in this paper can be used to identify an appropriate starting point for an initial method outline and design that takes pre-existing conditions into account, while recognising that the actual emergent method will and must evolve with the situation. Therefore, an adaptive ability is needed throughout the process to respond to: (1) technical discoveries, e.g. in the investigated case the realisation that web content management software is not sophisticated enough to meet the needs of the RDR development, and (2) changing or unexpected organisational and business circumstances, for example, the intervention of the Market Research Company's human resources department, the demand for a paper report, and pressure for an early win in the form of an operational deliverable.

The implications of the case for practice are that managers and developers should establish a clear business vision of what a project is to achieve and should organise work around this vision rather than around fixed project plans. Any formalised method, such as Multiview, is better thought of as a guide to organisation for the achievement of the vision rather than a prescriptive basis for project planning and action. Finally, managers and developers may have to accept that they are not entirely in control. This is not to say that they are powerless or that the project is out of control, but rather that control is an emergent property of the ISD situation.

Future work will involve the analysis of more cases to refine the theoretical ideas and the MEM technique and to identify patterns in the emergence of ISD projects that can be avoided or exploited depending on situational factors and interactions.

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