Chapter 18
A Transaction-Oriented Architecture for Structuring Unstructured Information in Enterprise Applications

Simon Polovina
Sheffield Hallam University, UK

Simon Andrews
Sheffield Hallam University, UK

ABSTRACT

As 80-85% of all corporate information remains unstructured, outside of the processing scope of enterprise systems, many enterprises rely on Information Systems that cause them to risk transactions that are based on lack of information (errors of omission) or misleading information (errors of commission). To address this concern, the fundamental business concept of monetary transactions is extended to include qualitative business concepts. A Transaction Concept (TC) is accordingly identified that provides a structure for these unstructured but vital aspects of business transactions. Based on REA (Resources, Events, Agents) and modelled using Conceptual Graphs (CGs) and Formal Concept Analysis (FCA), the TC provides businesses with a more balanced view of the transactions they engage in and a means of discovering new transactions that they might have otherwise missed. A simple example is provided that illustrates this integration and reveals a key missing element. This example is supported by reference to a wide range of case studies and application areas that demonstrate the added value of the TC. The TC is then advanced into a Transaction-Oriented Architecture (TOA). The TOA provides the framework by which an enterprise's business processes are orchestrated according to the TC. TOA thus brings Service-Oriented Architecture (SOA) and the productivity of enterprise applications to the height of the real, transactional world that enterprises actually operate in.

DOI: 10.4018/978-1-4666-4153-2.ch018

INTRODUCTION

The major benefit of adopting a structured model of a problem is so that such models draw out all the relevant parameters of a problem, from which its dynamics can be better understood and its possible solutions investigated more meaningfully. Contrast this with a written or spoken text discussion (such as word-processor document or emails), where ambiguities and obfuscations can occur easily. This 'natural language' interpretation of problems may be the most flexible and easily followed, but without at least a basis in some structured form it can be dangerously wrong. Yet it is claimed that 80-85% of all corporate information remains unstructured (Seidman & Ritsko, 2004). It is thus worryingly easy to omit or misinterpret the salient issues of a given business problem. Consequently, enterprises miss valuable business opportunities. Or they undertake transactions that they later regret, as recent financial turmoil have only too clearly shown (Borio, 2008; Kramer, 2008).

The accounting discipline provides sophisticated models for capturing the problem dynamics of economic activity in a structured way (Zimmerman, 2006). Accounting recognises the concern that "if it can't be measured then it can't be evaluated, and if it can't be measured it can't be managed". Accounting thereby offers the enterprise the tools it needs to capture and analyse otherwise unstructured data. Whilst we shall see that accounting too permits enterprises to omit or misinterpret the salient issues of a business problem, it offers a useful vehicle by which we may be able to capture unstructured information in a principled way – namely through the notion of transactions.

STRUCTURE THROUGH TRANSACTIONS

Previous work has identified how transactions might provide structure to the unstructured (Hill, Polovina, & Shadija, 2006; Polovina & Hill, 2005; Polovina & Hill, 2009). Enterprise Information Systems (EIS) echo this underpinning concept (Groenewegen, 1993). These systems model the enterprise and process its business activity based on the concept of a transaction. Such transactions may involve databases, accounting, financial/asset management, operational (e.g. payroll and pension), enterprise resource planning (ERP), decision support systems or others. These systems may only capture certain transactional elements of the domain that they represent. Accordingly, like accounting, these systems can omit or misinterpret the salient issues by making 'errors of omission or commission' (i.e. omit or misinterpret the salient issues of a business problem as we have described).

In Accounting

In order to provide a structure for modelling transactions the traditional model of accountancy, the bookkeeping model, was developed in the Middle Ages (Lee, 1986). The principle behind this model is economic scarcity. In other words for every benefit a sacrifice has to be made. For example, the benefit of a business owning its office is sacrificing £1,000,000 that could be employed elsewhere; a book prepared by its author researching a new exciting area in semantic understanding may have involved that author deciding against many complex yet important alternatives, such as the costs of not participating in his or her growing family. These 'transactions' occur because the decision-maker makes an intuitive (hence unstructured) 'value judgement' that the benefits outweigh the costs. The bookkeeping model is simple but rigorous. Fundamentally, instead of recording one amount per transaction it records two: A 'debit' and a 'credit'. Moreover these amounts are complementary to one another; hence they 'balance' against each other. An accounting 'balance sheet' is merely the aggregate of all these debits and credits. The rigorousness derives from this principled 'double entry' structure so that each benefit is accounted for by a cost and vice versa. Hence every gain is matched to a sacrifice.