An Approach
to Computer-based
Knowledge Representation
for the Business Environment
using Empirical Modelling

by
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Thesis
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To my parents

and

every member of the family
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Declarations

This thesis is presented in accordance with the regulations for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree. The work in this thesis has been undertaken by myself except where otherwise stated. Significant ideas in this thesis have appeared in:


During the research work associated with this thesis, two other publications were written jointly by the author and other members of the Empirical Modelling group: [Beynon+00b, Beynon+01a].
Abstract

The motivation for the thesis arises from the difficulties experienced by business people who are non-programmers with the inflexibilities of conventional packages and tools for model-making. After a review of current business software an argument is made for the need for a new computing paradigm that would offer more support for the way that people actually experience their business activities. The Empirical Modelling (EM) approach is introduced as a broad theoretical and practical paradigm for computing that can be viewed as a far-reaching generalisation of the spreadsheet concept.

The concepts and principles of EM emphasise the experiential processes underlying familiar abstractions and by which we come to identify reliable components in everyday life and, in particular, business activities. The emphasis on experience and on interaction leads to the new claim that EM environments offer a framework for combining propositional, experiential and tacit knowledge in a way that is more accessible and supportive of cognitive processes than conventional computer-based modelling. It is proposed that such environments offer an alternative kind of knowledge representation. Turning to the implementation and development of systems, the difficulties inherent in conventional methods are discussed and then the practical aspects of EM, and its potential for system building, are outlined.

Finally, a more detailed study is made of Decision Support Systems and the ways in which the EM focus on experience, and knowledge through interaction, can contribute to the representation of qualitative aspects of business activities and their use in a more human-centred, but computer-supported, process of decision making. Illustrations of the practical application of EM methods to the requirements of a decision support environment are given by means of extracts from a number of existing EM models.
Abbreviations

AI – Artificial Intelligence
DEM – Distributed Empirical Modelling
DBMS – Data Base Management Systems
DE – Decision Explorer
DSS – Decision Support Systems
EM – Empirical Modelling
GDSS – Group Decision Support Systems
IS – Information Systems
IT – Information Technology
ISM – Interactive Situation Model
ISMs – Interactive Situation Models
KR – Knowledge Representation
OCI – One-way Closed Interaction
RMM – Restaurant Management Model
SDSS – Strategic Decision Support Systems
SSM – Soft Systems Methodology
SODA – Strategic Option Development and Analysis
TOI – Two-way Open-ended Interaction