



**Empirical Modelling
for Participative Business Process Reengineering**



by

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dedicated to Jung-He and

Ming-Mei, my dad and mum



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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.

The perspective of Empirical Modelling for Business Process Reengineering has been published in (Chen et al., 2000a). The various aspects concerning the application of EM to Participative Process Modelling have been presented in (Chen et al., 2000b). The view of Interactive Situation Models relating to software system development and the framework of SPORE have been proposed in (Sun et al., 1999). Some of the technical work for the example of the warehouse management system has been described in (Chen et al., 2000a), (Chen et al., 2000b) and (Sun et al., 1999).



Abstract

The purpose of this thesis is to introduce a new broad approach to computing – *Empirical Modelling* (EM) – and to propose a way of applying this approach for system development so as to avoid the limitations of conventional approaches and integrate system development with business process reengineering (BPR). Based on the concepts of agency, observable and dependency, EM is an experience-based approach to modelling with computers in which the modeller interacts with an artefact through continuous observations and experiments. It is a natural way of working for business process modelling because the modeller is involved in, and takes account of, the real world context. It is also adaptable to a rapidly changing environment as the computer-based models serve as creative artefacts with which the modeller can interact in a situated and open-ended manner.

This thesis motivates and illustrates the EM approach to new concepts of *participative BPR* and *participative process modelling*. That is, different groups of people, with different perceptions, competencies and requirements, can be involved during the process of system development and BPR, rather than just being involved at an early stage. This concept aims to address the well-known high failure rate of BPR. A framework SPORE (situated process of requirements engineering), which has been proposed to guide the process of cultivating requirements in a situated manner, is extended to participative BPR (i.e. to support many users in a distributed environment). Two levels of modelling are proposed for the integration of contextual understanding and system development. A comparison between EM and object-orientation is also provided to give insight into how EM differs from current methodologies and to point out the potential of EM in system development and BPR. The ISMs (interactive situation models), built using the principles and tools of EM, are used to form artefacts during the modelling process. A warehouse and logistics management system is taken as an illustrative case study for applying this framework.



Abbreviations

ADM	Abstract Definitive Machine
AI	Artificial Intelligence
AMORE	A Methodology based on Object-Orientation for Reengineering Enterprises
BPR	Business Process Reengineering
BPRC	Business Processes Resource Centre
CORBA	Common Object Request Broker Architecture
CREWS	Cooperative Requirements Engineering With Scenarios
DEM	Distributed Empirical Modelling
DoNaLD	Definitive Notation for Line Drawing
DSS	Decision Support System
EDDI	Eden Definition Database Interpreter
EDEN	Evaluator for Definitive Notations
EM	Empirical Modelling
GST	General System[s] Theory
HCI	Human-Computer Interaction
IS	Information System[s]
ISM	Interactive Situation Model
IT	Information Technology
LSD	Language for Specification and Description
LSE	The London School of Economics and Political Science



- MIS Management Information Systems
- MIT Massachusetts Institute of Technology
- OMG Object Management Group
- OMT Object Modelling Technique
- OO Object-Orientation; Object-Oriented
- OOBE Object Oriented Business Engineering
- OOSE Object Oriented Software Engineering
- RE Requirements Engineering
- SCCS Source Code Control System
- SCOUT Notation for Screen Layout
- SPORE Situated Process of Requirements Engineering
- SSM Soft System Methodology
- TQM Total Quality Management
- UML Unified Modelling Language