Multi Agent Enhanced Business Intelligence For Localized Automatic Pricing In Grocery Chains

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Abstract

Business Intelligence Systems (BI) describe a form of data driven Decision Support Systems (DSS) that integrate a variety of concepts and technologies to gather, store and analyse data. Traditionally the focus of BI is on strategic and tactical decision support by providing decision makers a centralised and holistic view on organisational data. Today businesses are generating increasingly larger amounts of data due to regulatory requirements, business needs and new technologies. Managing and using this data in business decisions can be difficult because of the volume of the data, time pressure and general complexity of today’s business problems. In recent years there is a trend to extend BI to an operational level and make BI capabilities available to more workers. In addition to the technological change, business literature suggests the increasing importance of focusing on local market characteristics instead of standardisation across markets. The traditional BI concept does not fully reflect these operational and local requirements and should adapt to this new environment and these requirements to better support businesses in their decision making activities.

Agent and Multi Agent technology is often mentioned as an approach to design and develop flexible and distributed software systems. The technology is used in this research to design the Multi Agent Enhanced Business Intelligence (MAEBI) framework that focuses on distributing decision making capabilities throughout an organisation. Core to the MAEBI framework is the so called Decision Unit (DU) that encapsulates BI functionality with the extension of a Decision Execution (DE) module that allows implementing (changing business process) a decision without human interaction. The agent based design allows embedding a DU in the problem domain to make decisions with a local perspective. Despite the local focus of the MAEBI concept some aspects of the “centralised” BI approach are still maintained.

A prototype, pMAEBI (p=pricing), was implemented in the context of multi store retail pricing. Pricing is an important and complex problem for retailers and it
allows demonstration of some of the capabilities of a MAEBI based system. To evaluate the pMAEBI system a simulation testbed was implemented to analyse the prototype in comparison to a traditional “centralised” system. Simulation results indicate that the pMAEBI managed stores performed better (in terms of profit) than the comparison stores. These results indicate that the MAEBI concept is viable.
Statement of Originality

This thesis represents my own original work towards this research degree and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made”.

Alexander P. J. Loebbert
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Publication Arising from this Research


# Table of Contents

## CHAPTER 1 .............................................................................................................. 13

1.1 INTRODUCTION....................................................................................................... 13
1.2 APPLICATION ........................................................................................................... 15
1.3 RESEARCH QUESTIONS .......................................................................................... 16
1.4 METHODOLOGY ..................................................................................................... 17
1.5 JUSTIFICATION OF THE RESEARCH AND CONTRIBUTION ................................. 18
1.6 THESIS STRUCTURE ............................................................................................... 20

## CHAPTER 2  LITERATURE REVIEW ........................................................................ 23

2.1 INTRODUCTION ....................................................................................................... 23
2.2 DECISION SUPPORT SYSTEMS & BUSINESS INTELLIGENCE ............................ 24
   2.2.1 Introduction to BI and DSS ................................................................................ 24
   2.2.2 Definitions ........................................................................................................ 25
   2.2.3 BI Developments and Challenges ..................................................................... 28
   2.2.4 Summary (Business Intelligence) ..................................................................... 31
2.3 AGENT AND MULTI AGENT SYSTEMS .................................................................. 32
   2.3.1 Introduction ....................................................................................................... 32
   2.3.2 Agents .............................................................................................................. 34
   2.3.3 Multi Agent Systems (MAS) ............................................................................ 38
   2.3.4 Development Tools / Agents Platforms ............................................................. 39
   2.3.5 Debugging, Testing & Evaluation of Agent Systems ......................................... 43
   2.3.6 Agents and DSS/BI ......................................................................................... 47
   2.3.7 Summary (Agents) .......................................................................................... 48
2.4 RETAILING AND PRODUCT PRICING ................................................................. 49
   2.4.1 Introduction ....................................................................................................... 49
   2.4.2 Retailing ........................................................................................................... 50
   2.4.3 Pricing Strategies .............................................................................................. 51
   2.4.4 Pricing Decision Support Systems .................................................................... 55
   2.4.5 Why Retail Pricing is a suitable area of application ............................................ 56
   2.4.6 Summary (Pricing) ......................................................................................... 56
2.5 CHAPTER SUMMARY ............................................................................................... 57

## CHAPTER 3  METHODOLOGY ............................................................................... 59

3.1 INTRODUCTION ....................................................................................................... 59
3.2 RESEARCH PYRAMID ............................................................................................. 60
CHAPTER 4 - MULTI AGENT ENHANCED BUSINESS INTELLIGENCE (MAEBI) ... 81

4.1 INTRODUCTION ........................................................................................................ 81

4.2 MAEBI DESIGN OBJECTIVES ................................................................................. 82
  4.2.1 Objective 1: Supporting the Decision Process .................................................... 83
  4.2.2 Objective 2: Real Time BI ................................................................................. 85
  4.2.3 Objective 3: Localised ...................................................................................... 88
  4.2.4 Objective 4: Adaptive ..................................................................................... 89
  4.2.5 Objective 5: Automation ............................................................................... 91
  4.2.6 Design Objectives Summary & Research Gap ................................................ 93

4.3 MULTI AGENT ENHANCED BUSINESS INTELLIGENCE (MAEBI) ......................... 94
  4.3.1 Introduction ........................................................................................................ 94
  4.3.2 Agent & Multi Agent System ......................................................................... 95
4.3.3 MAEBI Components ................................................................. 97
4.4 An ILLUSTRATIVE case study: Mr. Chicken...................................................... 105
4.5 Distinction to similar areas ................................................................. 107
  4.5.1 MAEBI and MAS ................................................................. 108
  4.5.2 MAEBI vs. SOA ................................................................. 108
  4.5.3 MAEBI vs. ‘traditional’ BI .................................................... 109
  4.5.4 MAEBI vs. Distributed Data Mining (DDM) ....................................... 109
4.6 Summary ...................................................................................... 111

CHAPTER 5  - DESIGN EVALUATION (PRICING MAEBI) ................................. 112
  5.1 Introduction ................................................................................. 112
  5.2 Problem Domain - RETAIL PRICING ........................................... 113
  5.3 Testbed System ........................................................................... 114
  5.4 Tools and Technologies ............................................................... 116
    5.4.1 MS SQL Server ..................................................................... 116
    5.4.2 Axum .................................................................................. 117
  5.5 Pricing MAEBI (PMAEBI) ............................................................... 119
    5.5.1 Configuration Engine (CE) Implementation ................................ 119
    5.5.2 Decision Unit (DU) Implementation ........................................ 120
  5.6 Simulation Design ........................................................................ 125
    5.6.1 Simulation Objectives / Outcome ............................................. 125
    5.6.2 Assumptions ......................................................................... 127
    5.6.3 Simulation Process .................................................................... 128
    5.6.4 Simulation Objects .................................................................... 129
    5.6.5 Timing .................................................................................. 134
    5.6.6 Pricing Process ....................................................................... 135
    5.6.7 GUI .................................................................................... 137
  5.7 Simulation & Analysis ................................................................... 138
    5.7.1 Simulation Runs ......................................................................... 139
    5.7.2 Results .................................................................................. 142
  5.8 Chapter Summary ........................................................................... 145

CHAPTER 6  – RESEARCH EVALUATION ......................................................... 146
  6.1 Introduction ................................................................................... 146
  6.2 Hevner’s DSR Guidelines ............................................................. 146
    6.2.1 Design as an artifact ................................................................. 146
LIST OF TABLES

TABLE 2.1 - AGENT ATTRIBUTES (SYMEONIDIS AND MITKAS, 2005, PP. 42-43) .............................................. 36
TABLE 2.2 - ALTERNATIVE APPROACHES TO PRICING (PHILLIPS, 2005, P. 22) .............................................. 52
TABLE 3.1 DESIGN EVALUATION METHODS (HEVNER, ET AL., 2004, P. 83) .................................................. 71
TABLE 3.2 DSR PUBLICATION SCHEMA (GREGOR AND HEVNER, 2011 (WORKING PAPER)) ........................ 74
TABLE 3.3 DSR SUMMARY .................................................................................................................. 79
TABLE 4.1 AGENT CHARACTERISTICS MAPPED ON MAEBI (ADAPTED FROM PADGHAM & WINIKOFF, 2005) .......................................................... 108
TABLE 5.1 POS DATA ............................................................................................................................ 126
TABLE 5.2 STORE OBJECT ATTRIBUTES ......................................................................................... 130
TABLE 5.3 PRODUCT OBJECT ATTRIBUTES ....................................................................................... 130
TABLE 5.4 CUSTOMER OBJECT ATTRIBUTES ...................................................................................... 132
TABLE 5.5 PRODUCTS (EXAMPLES) ........................................................................................................ 141
TABLE 5.6 PRODUCTS IN SIMULATION ............................................................................................... 141
TABLE 5.7 VARIABLES DESCRIPTION ................................................................................................... 141
TABLE 5.8 RESULTS (TOTAL) ............................................................................................................... 143
TABLE 5.9 AVERAGE RESULTS OVER ALL STORES IN ALL SIMULATION RUNS .............................. 143
TABLE 6.1 PEFERS ET AL. (2008) PROCESS MAPPING ............................................................................. 152
LIST OF FIGURES

FIGURE 1.1 DESIGN SCIENCE RESEARCH METHODOLOGY (DSRM) PROCESS MODEL (PEFFERS, ET AL., 2008, p. 14) .......................................................... 18
FIGURE 1.2 - RESEARCH OVERVIEW .............................................................................................................. 21
FIGURE 2.1 BI COMPONENTS (NEGASH AND GRAY, 2008, p. 177) ................................................................. 26
FIGURE 2.2 – AGENT (LOCKEMANN, 2006, p. 21) ......................................................................................... 35
FIGURE 2.3 BLACKBOARD COMMUNICATION - ADAPTED FROM TIMM ET AL. (2006, p. 39) .................. 39
FIGURE 2.4 SOFTWARE IN THE LOOP TESTBED ............................................................................................ 46
FIGURE 2.5 - PRICE VALUE CONTEXT SOURCE: (H. SIMON, 1989) ............................................................... 51
FIGURE 2.6 - TAXONOMY OF PRICING MECHANISMS SOURCE: (SCHWIND, 2007, p. 28) ......................... 54
FIGURE 3.1 RESEARCH PYRAMID (JONKER AND PENNINK, 2009, p. 23) ....................................................... 61
FIGURE 3.2 IS RESEARCH FRAMEWORK (HEVNER, ET AL., 2004, p. 80) ..................................................... 64
FIGURE 3.3 DESIGN SCIENCE RESEARCH METHODOLOGY PROCESS MODEL (PEFFERS, ET AL., 2008) ...... 67
FIGURE 3.4 SOFTWARE IN THE LOOP TESTBED .......................................................................................... 72
FIGURE 4.1 BOYD’S OODA LOOP (HAAS, ET AL., 2011, p. 178) ................................................................. 84
FIGURE 4.2 ZERO-LATENCY-ENTERPRISE ADOPTED FROM (NGUYEN AND TJOA, 2006, p. 168) ......... 86
FIGURE 4.3 BI PROCESS (MICHALEWICZ, ET AL., 2007, p. 4) ..................................................................... 90
FIGURE 4.4 ADAPTIVE BI PROCESS (MICHALEWICZ, ET AL., 2007, p. 5) ................................................... 91
FIGURE 4.5 - AUTOMATION LEVELS FROM (CUMMINGS, 2004, p. 2) ....................................................... 92
FIGURE 4.6 DECISION UNIT (DU) OVERVIEW .............................................................................................. 98
FIGURE 4.7 DECISION EXECUTION .............................................................................................................. 102
FIGURE 4.8 BLACKBOARD COMMUNICATION - ADAPTED FROM TIMM ET AL. (2006, p. 39) ............. 104
FIGURE 4.9 DATA MINING VS DISTRIBUTED DATA MINING (ADOPTED FROM PARK AND KARGUPTA, 2002) ....................................................................................................................... 110
FIGURE 5.1 CHAPTER 5 OVERVIEW ............................................................................................................. 113
FIGURE 5.2 DEMAND - PRICE - SUPPLY .................................................................................................... 114
FIGURE 5.3 SOFTWARE-IN-THE-LOOP TESTING .................................................................................. 115
FIGURE 5.4 TESTBED ARCHITECTURE .................................................................................................... 116
FIGURE 5.5 CE WORKFLOW .................................................................................................................. 120
FIGURE 5.6 DECISION UNIT (DU) .......................................................................................................... 121
FIGURE 5.7 DM/KD WORKFLOW ........................................................................................................ 123
FIGURE 5.8 DE MODULE ....................................................................................................................... 124
FIGURE 5.9 SIMULATION PROCESS ..................................................................................................... 129
FIGURE 5.10 - CUSTOMER WORKFLOW ............................................................................................ 134
FIGURE 5.11 – TIMER ........................................................................................................................... 135
FIGURE 5.12 GUI SCREENSHOT ........................................................................................................ 138
FIGURE 5.13 SALES / PROFIT .............................................................................................................. 144
FIGURE 6.1 DESIGN SCIENCE RESEARCH METHODOLOGY PROCESS (PEFFERS, ET AL., 2008) ........ 151