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Integration of business modelling methods for enterprise information system analysis and user requirements gathering

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Abstract

Business process modelling is an essential part of developing an enterprise information system. There are many modelling methods with software support currently available on the market. Each individual method has its own advantages and disadvantages but always has the limitation of only representing a certain view of enterprise. To describe a system clearly from different perspectives and to provide a complete understanding of the business process both to the developer and to the end-user, it is necessary to adopt more than one kind of modelling technique to establish a set of graphical models describing a system from different views.

The modelling approach described in this paper is composed of three widely used modelling methods: IDEF0 to establish functional models, IDEF3 to capture process descriptions, and DFD to describe information/data flow among the activities. It is a staged approach in which different modelling method is used at different levels of granularity and details of information required. After a careful evaluation and comparison (including respective advantages and disadvantages) of the three adopted modelling methods, a guideline is proposed for using a composite of these three modelling methods to establish a set of business process models from different perspectives. The aim is to combine the advantages of each modelling method and maximise the effect of modelling work. Finally, a case study is presented in order to illustrate the effectiveness of such a modelling framework.
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1. Introduction

A business process is a set of one or more linked procedures or activities which collectively realise a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships [1]. Business process modelling is essential for developing an enterprise information system.

There are many modelling methods with software support currently available on the market. Each method has its own advantages and disadvantages, and each individual method is limited with regard to the view of the enterprise that it can present. To describe a system clearly from different views, and provide a complete understanding of business processes both to the developer and to the end-user, it is necessary to adopt more than one kind of modelling technique to establish a set of graphical models

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describing a system from different views [2]. Even though most experts accept such a notion and have carried out a lot of research work, it lacks practical guidelines in engineering. The aim of this paper is to present such a guideline and provide some suggestions on how to choose and use modelling methods in system analysis and user requirements gathering.

Object-oriented (O-O) modelling techniques are very popular currently because they are programming oriented and can shorten the development life cycle. But at the stage of system analysis and user requirements gathering, a structured methodology is still irreplaceable. The conventional structured modelling method for this stage is IDEF0. IDEF0 has been practised in industrial IT projects for decades. It has proven to be easy to understand by business people acting as a bridge for better communication between technical developers and industrial end-users. Even though there are many newer modelling alternatives to IDEF0, few are as acceptable as IDEF0 for business people. IDEF0 modelling is a strict top-down process. It is initiated from a top-level diagram, and decomposed to several bottom-levels. As with other modelling methods, IDEF0 has the inherent limitation of not being able to describe all aspects of the system. Some complementary modelling methods can be used to work together with IDEF0, such as IDEF3 and DFD, which is suggested for this paper. According to conventional structured approach, if one chose IDEF0, IDEF3 and DFD as the business process modelling methods for system analysis and user requirements gathering, the process would be:

- IDEF0 modelling, from top-level to bottom-level;
- IDEF3 and DFD modelling, at lower levels encompassing specific details, to offset the limitations of IDEF0.

This process follows top-down structured decomposition rules, but in real industrial practice, the authors have found that a combination of top-down and bottom-up modelling approach is more practical, especially for AS-IS analysis. The conventional approach can be changed to; firstly carry out top-level IDEF0 modelling, followed by bottom level IDEF3 and DFD modelling and finally create bottom-level IDEF0 models. These bottom level IDEF0 AS-IS models form a very good basis for the initial stages of the TO-BE design and help to accelerate the requirements process.

In Sections 2 and 3, the authors evaluate and compare modelling methods and a staged modelling approach has been adopted to establish business models for end-users. The modelling approach is composed of three widely used modelling methods: IDEF0 to establish functional models, IDEF3 to capture process descriptions, and DFD to describe information/data flow among activities.

As a basis for discussion, a brief review of modelling methods and tools is made in Section 2. In Section 3, a careful evaluation and comparison of the three adopted modelling methods is made looking at the advantages and disadvantages of each. Then a guideline for using a combination of these three modelling methods to establish a set of business models at different stages and from different views is proposed. The aim is to combine the advantages of each modelling method, thus maximise the effect of modelling work. In order to illustrate the effectiveness of such a modelling idea, a case study is presented in Section 4. Finally, some conclusions and remarks are presented in Section 5.

2. Review of modelling methods and tools for information system analysis and design

A variety of methods and tools can be used to promote enterprise information system development. A classification of the modelling methods and techniques most frequently used is summarised in Fig. 1.

There are three levels shown in Fig. 1. The top level shows the enterprise modelling frameworks, which provide generalised reference architectures and methodologies to guide system analysis and design for the whole life cycle [3]. Among the most widely used of these are CIMOSA, GIM and PERA [4]. CIMOSA, developed by the European AMICE Consortium during the early 1990s, provides a consistent architectural framework for enterprise modelling and integration [5,6]. The CIMOSA Cube illustrates three dimensions; the dimension of instantiation (three levels: generic, partial and particular), the dimension of model derivation (three modelling levels: requirements, design and implementation), and the dimension of view (function, information, resource and organisation). GIM, originally stood for GRAI-IDEF0-Merise [7], now called GRAI Integrated Methodology [8], has its origin in