Bridging the Gap Between Organisational Needs and ERP Functionality

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We argue that Enterprise Resource Planning (ERP) installations are difficult to align to specific requirements of the enterprise because of the low level at which ERP functionality is described. We raise this level from a functional description to a goal-oriented one. We use SAP R/3 to illustrate this. A SAP goal expresses the task that a SAP function carries out and abstracts away from the performance of this task. Since a SAP goal can be achieved in many ways, we introduce the notion of SAP strategies. We organise goals and strategies as a directed graph called a map. We illustrate the map with the Materials Management Module of SAP. In order to evaluate and compare the use of the map with the functional approach, we develop an evaluation framework. The evaluation and comparison are presented. The materials management map is then used to align the SAP module to the stores and purchase department of an academic institute.

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1. Introduction

Enterprise Resource Planning (ERP) systems provide a software solution comprising several interconnected modules covering most of the key functions (human resource management, sales, treasury, etc.) of an enterprise. According to benchmarking done by the Partner Group in 1998, the installation of an ERP system has the following drawbacks:

1. high costs;
2. difficult and time-consuming implementation;
3. need for enterprise process re-engineering;
4. difficult alignment to specific requirements of the enterprise;
5. need for massive allocation of internal resources;
6. lack of technical support by the ERP system vendor;
7. high possibility of cultural clash.

Our concern is with drawback 4 above and to a certain extent with 7 as well. We illustrate our approach by considering the Materials Management Module of SAP R/3 [1].

At the highest level, SAP provides a number of modules for different areas of a business. These modules contain components each for a specific sub-area. These components are composed of a set of functions. To enable customising, SAP permits variations in function operation. For example, it allows physical inventory check to be performed by sampling, periodic monitoring or continuously and the exact variant is chosen during customising. The description of SAP R/3 [1] components/functions and variants highlights the ‘whats and hows’ of their operation. It naturally deals with the data that is to be maintained/supplied and the actions that are carried out. The mapping of a business process to this level of description is evidently not a straightforward task. SAP R/3 obtains this mapping by forcing organisations to realign their processes to the SAP R/3 Enterprise Model.

In Fig. 1 we show this at the lower level by the relationship between enterprise business processes and the functions of the SAP Enterprise Model. At this level the alignment to organisational needs is difficult to achieve because (a) the amount of detail to be handled is very large and mastering it gets very difficult, and (b) organisations think in terms of their goals and objectives...
and not in terms of SAP functions. The latter results in a mismatch between organisational requirements and their resolution in SAP.

To obviate these difficulties we propose that the expression of the functionality of an ERP system should be done in a goal-driven manner. Goal-oriented approaches have been found useful in both requirements engineering [2–5, 15] and BPR [6–10]. In the former they have proved useful in aligning system functions to organisational requirements whereas in the latter goals drive the re-engineering of business processes; thus, they can help in resolving problem (b) above. By avoiding unnecessary details, goal-oriented approaches help in focusing attention on what is to be achieved and the strategies required to achieve them, thus contributing to the resolution of problem (a).

Our proposal is that the alignment should be done at the higher level of enterprise business goals. As shown in Fig. 1, this means that we should develop the notion of SAP goals. A SAP goal expresses the task that a function carries out and abstracts away from the performance of this task. In so doing, it emphasises the purpose of the function, its goal. This helps in selecting the SAP function that meets the organisation’s goals.

Goal modelling constructs AND/OR goal hierarchies [11] where AND represents goal decomposition and OR represents alternative ways of achieving a higher goal. Both constructs are relevant for SAP goals. The former helps us in reasoning about tasks at different levels of abstraction. The latter gives us the notion of the strategy for goal achievement. This is useful because SAP strategies will make explicit the different ways in which an organisation can achieve an intention and, thus, help in the selection of the appropriate SAP function variant.

We conclude that the alignment problem would be mitigated by the development of a representation system based on goals and strategies. In this system, the tasks performed by functions would be goals and the different ways in which tasks are performed would be goal-achievement strategies. We propose to use the notion of a map to represent SAP goals/strategies. A map is a directed labelled graph, with nodes as intentions and strategies as edges. An edge entering a node identifies a strategy that can be used for achieving the intention of the node. The map therefore shows which intentions can be achieved by which strategies once a preceding intention has been achieved. Evidently, the map is capable of expressing organisational goals and their achievement. In this paper we show how it can form the bridge between the high-level expression of goals/strategies and the low-level functional view of SAP.

The layout of the paper is as follows. In the next section we present the notion of a map. In Section 3 we provide an overview of SAP R/3 and a short description of the Materials Management Map. In Section 4 the business of Materials Management is represented as a map. In Section 5 we discuss how this representation helps to resolve the alignment problem. We illustrate the use of the map to align the requirements of Materials Management in an academic institution in Section 6. Finally, we draw some conclusions and identify future work in Section 7.

2. The Concept of a Map

A map is a process model expressed in intentional terms. It provides a representation system based on a non-deterministic ordering of intentions and strategies. We will use it as a means for representing SAP goals/strategies and as a basis for aligning SAP functions to organisational requirements.

2.1. Introducing the Map

A map is a labelled directed graph with intentions as nodes and strategies as edges between intentions. The directed nature of the graph shows which intentions can follow which one. An edge enters a node if its strategy can be used to achieve the intention of the node. Since there can be multiple edges entering a node, the map is capable of representing the many strategies that can be used for achieving an intention.

An intention is a goal that can be achieved by the performance of a process. It refers to a task that is expressed at the intentional level and is part of the process. Each map has two special intentions, Start and Stop, to start and end the process respectively.

A strategy is an approach, a manner to achieve an intention. The strategy $S_{ij}$ characterises the flow from the source intention $I_i$ to the target intention $I_j$ and the way $I_j$ can be achieved once $I_i$ has been achieved.

A section is the key element of a map. It is a triplet $<I_i, I_j, S_{ij}>$ and represents a way to achieve the target

Fig. 1. Levels of description.