



Creating Agile Business Systems with Reusable Knowledge

Amit Mitra and Amar Gupta

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Reviewed by Paul Harmon

In January of 2006 I reviewed the first book by Mitra and Gupta, *Agile Systems With Reusable Patterns of Business Knowledge: A Component-Based Approach*. (Artech House, 2005) They have now published a second book in the series. The second book, like the first, is very technical and discusses the underlying ideas that form the foundation of the earlier book. It is not a book that will be of interest to the casual reader.

Let's begin by considering what the first book is all about. The first book suggests that a really sophisticated and agile business model should be based on a model of the knowledge and rules used by the firm. In the Eighties, I was primarily concerned with expert systems. The simpler expert systems were sets of rules. The more sophisticated expert systems, however, combined rules and networks of knowledge objects (which were called Frames). If one was building an expert system to identify animals, the top knowledge object would be an animal. Associated knowledge objects might be birds, mammals, fish, reptiles, and so forth. Each of those objects would have their own associated objects. Links between objects would represent relationships. Thus, Birds were a type of Animal. Hawks were a type of Bird. In essence, a group of objects and attributes described a domain of knowledge – knowledge about animals in this case. Rules provided a way of reasoning about specific data. Thus, IF an animal is covered with feathers, THEN it is a bird.

When one sought to build an expert system one normally began by interviewing a human expert. The knowledge of experts has, in most cases, not been captured. Textbooks may provide formal definitions of domains, but real experts solve problems using rules to reason about data. Most of those "knowledge rules" were developed by the human expert in the course of struggling with problems over the course of his or her professional life. A few valuable expert systems were developed in the Eighties, but by the end of the Eighties, most expert systems development stopped. It turned out to be too hard to maintain the expert knowledge. Real experts are constantly reading, solving new problems, going to conferences and otherwise renewing and revising their knowledge. It's easier and more cost effective to hire an expert than it is to try to capture and maintain an expert's knowledge.

In the Nineties, most of the vendors who had formerly sold expert system building tools repositioned themselves. Most became business rules vendors. Business rules are derived from company policies. They are much easier to capture and maintain. The rules tools have proved useful in helping companies enforce business rules and policies. Anyone attending a business rules conference will encounter these former expert system vendors.

Recently, some of the business rules vendors have repositioned themselves a second time and become Business Process Management Systems (BPMS) vendors. Most business people think of business processes as a series of activities and decisions. You analyze the new insurance policy application. If the application is complete, you send it to underwriting. If it is incomplete,

you return it to the salesperson requesting that he or she get more information from the applicant. The underwriter assigns an evaluation to the claim. A clerk then notifies the applicant that the application is approved and sets up a file for the new client, etc. This process-oriented perspective makes sense to managers because they focus on things like applications and actions on the part of employees. It is possible to think about a process as a set of rules. In essence, the rules form an elaborate pattern of IF-THEN-ELSE statements. To move through the pattern, is, logically, the same thing as working through the activities of a process. In fact, most of the rule vendors that have positioned themselves in the BPMS market offer “process interfaces” that let business people represent activities and arrows which they can translate into rules.

The business rules movement has enjoyed considerable success, especially in the financial and insurance industries. Many companies have business rules teams that focus on aligning company policies and rules and assuring that everyone in the company follows those rules. In many cases, they have been able to use rule engines to automatically process rule sets and speed up or improve the quality or consistency of company decisions. (In a recent announcement, ILOG, a former expert system vendor, announced that their rule system had helped Fannie Mae (NYSE:FNM) reduce the time it took to underwrite mortgage loan applications from 20 days to an average of 20 minutes.)

Much of the current success enjoyed by the business rules movement is based on the fact that it is much easier to capture and maintain explicit rules derived from explicit policies than to capture and maintain the vague rules that currently reside only in the heads of human experts.

This is where things stood in 2006 when the first Mitra and Gupta book, *Agile Systems*, came out. What Mitra and Gupta proposed was nothing less than building an expert system to capture all the knowledge required to run a company – in essence, to build a huge expert system to describe a company. It might happen someday, but probably not in the next decade. On the other hand, every company is becoming more automated, and there is a growing number of companies that do highly specialized work. Thus, for example, there are companies that collect together shipping requirements from groups of companies, configure truckloads, and purchase shipping from truckers. These intermediaries take many forms, do valuable work, and do it almost entirely by applying a kind of business logic. Increasingly the work of these companies will be formalized and we will undoubtedly see more efforts to completely formalize the knowledge used in such operations.

In their first book, Mitra and Gupta proposed formal knowledge models of several types of businesses. In other words, they offered knowledge-based frameworks, or templates, for different industries. (Think of them as component models of an architecture, but with the components structured to describe the knowledge used in the companies.) These components could be extended by any specific company to capture specific company operations. Similarly, these knowledge models/component frameworks formed the basis for rule sets. Mitra and Gupta have ranged well beyond the expert systems thinking of the Eighties to imagine what kind of system would be required to capture a corporation’s knowledge. They have certainly benefited from the work of the business rules community, but have also ranged beyond their concerns to consider how their systems might capture both business rules and the rules used by human experts. I don’t believe they have given sufficient consideration to the maintenance problem, but if one conceptualizes both these books as thought experiments designed to suggest how one might think about this problem, then the issue isn’t so much practicality as logical completeness and scalability.

The first book seems completely down-to-earth, however, compared with the latest book from Mitra and Gupta. *Creating Agile Business Systems with Reusable Knowledge* is a 383 page book that is divided into an introduction and four chapters. Chapter 1 describes the nature of

reality. Chapter 2 defines an object. Chapter 3 describes the nature of attributes, and Chapter 4 (which is 157 pages long) “formally describes the concepts of pattern, measurability, and more importantly, the meaning of immeasurability.”

As I suggested earlier, this is not light reading and I don't recommend reading the second book if you haven't read the first one. Ideally, you should have read *Agile Systems With Reusable Patterns of Business Knowledge: A Component-Based Approach* first, decided that your company could benefit from a solid knowledge of a component/rules approach, and decided you want to become an expert on all the technical aspects required for such an effort. If you are such a person, and are enthusiastic about the prospect, then you will find this book useful. In addition, some software architects, and business object and AI theorists will want to read this book. For those individuals looking for a comprehensive and detailed introduction to the metamodeling and knowledge systems concepts that underlie rule-based approaches to business systems, this book will prove interesting.

Paul Harmon is the Executive Editor of BPTrends. He is the co-author of several books on expert systems and the author of *Business Process Change: A Manager's Guide to Improving, Redesigning and Automating Processes*.