

# Eliciting Data Warehouse Contents for Policy Enforcement Rules

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## ABSTRACT

*Data Warehouse requirements engineering has been extensively looked at from the ENDS perspective of the Business Motivation Model, in terms of goals the system to-be wants to achieve. The authors propose that the MEANS perspective of this Model can drive the requirements engineering process. MEANS are organized into business policies and 'policy enforcement rules'. Starting from policies expressed in a higher order logic, the authors propose an approach to formulate policy enforcement rules. That subset of the set of formulated policy enforcement rules which is most appropriate for the business is to be selected. For this, the information relevant to the rules is to be kept in the Data Warehouse. The authors technique picks up the components of the policy enforcement rule to elicit the information that has a bearing on its selection. The elicited information is represented as an ER diagram. The authors rely on existing methodologies to convert an ER form into star schemas. The authors use the medical domain to illustrate our methodology.*

*Keywords:* Data Warehouse, Information, Policy, Policy Enforcement, Requirements Engineering

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## INTRODUCTION

Data Warehouse Requirements Engineering, DWRE, is concerned with arriving at the information contents of the Data warehouse, DW, To-Be. The scope of DWRE is divided in two parts, organizational and technical. The organizational part deals with the role of the DW in the larger context of the business whereas the technical part looks at the requirements of the technical

solution to be put in place. Taken holistically, DWRE spans across "business information" to be kept in the Data Warehouse and determining its facts and dimensions.

Consider the three life cycles of DW development described in (Prakash 2008), namely, data base driven, ER driven, and goal driven. The main task in the data base driven (Golfarelli, 1999) and ER driven (Hüsemann, 2000) life cycles is to restructure data bases and

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ER diagrams respectively to determine the required facts and dimensions. The Goal oriented approaches (Prakash, 2008; Boehnlein, 1999; Boehnlein, 2000; Bonifati, 2001; Giorgini, 2005; Prakash, 2003) explore system/organizational goals and determine star schemas. (Prakash, 2012) has introduced the notion of a target. Targets participate in two hierarchies, the relevance and fulfilment hierarchies. It has been shown that these hierarchies lead to determination of the information to be kept in the Data Warehouse To-Be. In (Prakash, 2012) the process of arriving at star schemas has been split into two parts (i) an 'early information' part where the information relevant to decision making is discovered and (ii) a 'late' part where the discovered information is structured as facts and dimensions. As explained in (Prakash, 2012) 'early' information is that which is in: an abstract, relatively fuzzy form devoid of any structure. Yet, all requirements for example, of history and aggregation are identified here.

We can look at the foregoing body of work from the point of view of a business. The Business motivation Model (BRG, 2010), BMM, of BRG provides a framework for this. This model says that a business has an Ends and a Means perspective. The means are the ways of achieving the ends. The Ends aspect of the model introduces the concepts of Vision, Goal and Objective. Vision is (BRG, 2010) "an overall image of what the organization wants to be or become"; goal is "a statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means; objective is "a statement of an attainable, time-targeted and measurable target that the enterprise seeks to meet in order to achieve its goals". The Means aspect contains concepts like Mission, Courses of action and directives. Mission is (BRG, 2010) "the ongoing operational activity of the enterprise. The Mission describes what the business is or will be doing on a day to day basis"; a course of action is and approach or plan for configuring some aspect of the enterprise; a directive can be either a business policy which is "a directive

that is not directly enforceable whose purpose is to govern or guide the enterprise" or a business rule influences business behaviour and "is derived from Business Policy".

It can be seen that goal oriented techniques referred to earlier address the business concept of a goal of the Ends part of the framework. Horkoff and Yu (Horkoff, 2012) observe "goal modeling is not yet widely used in practice" but has been successfully applied in case studies. The inhibiting factors in adoption of goal-oriented techniques were identified in (Rolland, 2003) as (a) Domain experts find the notion of a goal to be fuzzy which makes it difficult to deal with it, and (b) Goal reduction is not a straightforward process.

Business analytics/intelligence is now receiving attention. This term is (Mathrani, 2013; Souza, 2012; Haque, 2010; Barone, 2010; Watson, 2007; Wu, 2007; Golfarelli, 2004) used in business to refer to applications and technologies that help managers to take better informed decisions. From this perspective data warehousing is a BI platform (Souza, 2012). As pointed out in Prakash (2012), a business analytic is SMART, Specific, Measurable, Achievable, Relevant, and Time bound. It is an objective to be achieved in the sense of BMM and is more concrete than the goal of BMM. Consequently, this may obviate the problems pointed out by Rolland (2003).

Consider, now, the problem, given goals and objectives what are the right policies and policy enforcement rules to reach them. This requires examination of the Means part the BMM framework. In Prakash (2011), it was shown that an organization needs to take decisions about its:

1. **Policies:** This is the first part of managerial decision making in (Prakash, 2011);
2. **Policy enforcement rules:** This is the second part of managerial decision making (Prakash, 2011);
3. **Operations:** This is the imperative decision making part of Prakash (2011).

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