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Chapter XIX

Metrics for Managing Quality in Information Modeling

Mario Piattini, Marcela Genero, Coral Calero,
Macario Polo and Francisco Ruiz,
Grupo ALARCOS, Universidad de Castilla-La Mancha, Spain

INTRODUCTION

In a global and increasingly competitive market, quality is a critical success factor for all economical and organisational aspects and especially in Information Systems (IS). We can affirm that in the next millennium information quality will be an essential factor for company success in the same way product and service quality have been over the last years. It is essential to tackle the subject of information quality in order to achieve a good IS for the company; this way data become true information and knowledge. Companies must manage information as an important product, capitalise knowledge as a main asset, surviving and prospering in the digital economy (Huang et al., 1998). Improving information quality will enhance client satisfaction and, at the same time, personnel satisfaction, while improving the company as a whole.

Unfortunately until a few years ago, quality approaches focused on program quality and disregarded information quality (Sneed and Foshag, 1998). Even in traditional information modeling and database design, quality related aspects have not been incorporated explicitly (Wang and Madnick, 1993). It is time to consider information quality as a main goal to pursue, instead of as a subproduct of information modeling or a database creation processes. Quality in information modelling has traditionally been a poorly understood area. Most of the work done until a few years ago was limited to listing a set of properties or desirable characteristics for conceptual data models and proposing different transformations for improving schema quality (Batini et al., 1992; Reingruber and Gregory, 1994; Boman et al., 1997). Recently, some interesting frameworks have been proposed for addressing quality in informa-

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tion modeling in a more systematic way (Moody and Shanks, 1994; Krogstie et al., 1995; Shanks and Darke, 1997; Moody et al., 1998).

However, quality criteria alone are not enough to ensure the quality in practice because people will generally make different interpretations of the same concept. According to the Total Quality Management (TQM) literature, measurable criteria for assessing quality is necessary to avoid "arguments of style" (Zultner, 1992). Measurement is fundamental in order to apply statistical process control which is one of the key techniques in the TQM approach (Deming, 1986). Measurement is used not only for understanding, controlling, and improving development, but also for determining the best ways to help practitioners and researchers (Schneidewind, 1997).

The objective should be to replace intuitive notions of quality in information modeling, with formal, quantitative measures, thus, helping to reduce subjectivity and bias in the evaluation process.

In this chapter we will give an overview of the work carried out regarding quality in information modeling, and we will also propose a set of new metrics for evaluating quality in information modeling. Finally, we discuss future and emerging trends in this area and provide some concluding remarks.

QUALITY IN INFORMATION MODELING

Although the information modelling phase represents only a very small portion of the overall development effort, its impact on the final result is probably greater than in any other phase (Simsion, 1991). Conceptual data models lay the foundation for all later design work, and are a major determinant in the quality of the overall system design (Meyer, 1988; Sager, 1988). Quality in conceptual modeling is not well-understood. There are no generally accepted guidelines for evaluating the quality of conceptual data models, and little agreement has been reached even among experts as to what makes a "good" conceptual data model (Moody and Shanks, 1994).

Quality in conceptual modeling is frequently defined as a list of desirable properties of a conceptual data model (Roman, 1985; Batini et al., 1992; Simsion, 1994; Levitin and Redman, 1994; Reingruber and Gregory, 1994; Boman et al, 1997). These properties are usually developed on the basis of experience in practice, intuitive analysis and reviews of relevant literature. These properties provide a useful starting point for understanding and improving quality in conceptual modelling. However, they are mostly unstructured, use imprecise definitions and often overlap. The properties of models are often confused with language and method properties and some goals are unrealistic, even impossible to reach. More elaborated evaluation frameworks are needed within which any two conceptual data models, no matter how different they may be, can be compared accurately, objectively and comprehensively (Moody, 1998).

Recently, some frameworks have been proposed which attempt to address quality in conceptual modeling in a much more systematic way (Eick, 1991; Pohl, 1994; Lindland et al., 1994; Moody and Shanks, 1994; Krogstie et al., 1995; Kesh, 1995; Shanks and Darke, 1997; Schuette and Rotthowe, 1998; Moody et al., 1998). An overview of these frameworks and other approaches to quality in conceptual

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