

Chapter 5

Developing Business Intelligence Product and Metacontent Map (BIP-Map)

Chin-Hoong Chee

Universiti Teknologi PETRONAS, Malaysia

ABSTRACT

A business intelligence (BI) system provides users with multi-dimensional information (a so-called “BI product”) to support decision making. However, existing BI systems overlook the lineage metadata which supports individual data quality dimensions such as data believability and ease of understanding. Using a design science research paradigm, this chapter proposes and develops an integrated framework (known as BI product and metacontent map – “BIP-Map”) to facilitate the traceability and accountability of BI products. Specifically, the business workflow layer of the integrated framework is modelled using business process modelling notation, and an information product map is used to model the second layer’s information manufacturing process, whilst the third layer represents the metacontent detail of the data validation stage, from source system through to ETL, to the data warehousing stage. The integrated framework addresses individual-related data quality issues and builds user confidence by enhancing the traceability and accountability of a BI product.

INTRODUCTION AND RESEARCH MOTIVATION

In recent years, business intelligence (BI) tools have emerged as one of the top spending priorities for many CIOs (Gartner 2013a). It is reported that worldwide business intelligence software revenue surpassed US\$12 billion dollars in 2012 (Gartner 2013b). Organisations are willing to invest heavily in BI because this technology enables companies to make fact-based decisions which can increase revenue, cut costs, and provide competitive advantage (Bogza & Zaharie 2008). According to Wixom and Watson (2010, p.14), business intelligence is “*a broad category of technologies, applications, and processes used for gathering, storing, accessing, and analysing data to help its users make better decisions*”. In other words, BI is a system that allows users to leverage disparate data sources so that they can make informed

DOI: 10.4018/978-1-5225-5718-0.ch005

business decisions (Elbashir et al. 2008; Negash 2004). To do so, BI systems are designed to provide decision-makers with BI products¹ delivered at the right time, at the right place, and in the correct form (Negash 2004). A BI product is akin to manufacturing a physical product in the factory because most of the processes used in product quality-control are applicable in producing higher quality information (Ballou et al. 1998; Shankaranarayanan et al. 2003).

While the BI market appears vibrant and while the importance of BI systems is more widely accepted, a weakness of current systems is that data are treated too technically without considering the 'soft' aspects of the information; for instance, aspects such as data lineage and reliability are often ignored (Foshay 2005; Foshay et al. 2007; Shankaranarayanan et al. 2003). A data-driven BI system that concentrates mainly on data itself will yield lower levels of efficiency in business decision making (Ou & Peng 2006). This is because business decision-making is a complex process which involves not only hard data, such as sales volumes, but also other considerations such as the information manufacturing process and standard operating procedures (SOP) of the company. For example, any changes in the SOP or business workflow may affect the operations of the business which, in turn, affects how data are generated; indeed, such changes can affect the reliability of the BI product manufacturing process itself. Moreover, contemporary managers are forced to make optimised decisions in the shortest possible time in response to today's highly competitive and fast-paced business environment (Delen & Pratt 2006). Yet, business users still rely on IT to supply the metadata/metacontent², a time-consuming process which can delay them from acting/reacting promptly. A problem with current BI systems is that business users typically engage only at the complex analysis layer without access to adequate metacontent to support their decision-making. Dynamic decision-support demands adequate lineage metadata³ as well as sufficient knowledge of business workflow and BI product manufacturing processes.

Due to inadequate lineage metadata in existing BI systems (Foshay 2005; Foshay et al. 2007), questions have been raised about the ability of business users who are not technically-savvy to understand the BI environment or to adequately comprehend the highly-granular information provided by BI technologies. Consequently, the problems associated with individual-related data-quality dimensions, such as ease of understanding, data believability, and accessibility, are becoming more pronounced (Wang & Strong 1996). Similarly, there are problems in understanding the relationships of all participants and processes for a business transaction (Tan et al. 2008). Therefore, the provision of comprehensive metadata to enhance the understanding of BI products has grown in importance (Foshay 2005; Foshay et al. 2007; Shankaranarayanan & Even 2006).

While 'metadata' has been defined as 'data about the data', this paper uses the definition suggested by Dempsey and Heery (1998, p. 155) who describe it as "data that is associated with objects which relieves their potential users of having full advance knowledge of their existence or characteristics." This definition addresses individual-related data quality challenges, especially BI product believability, ease of understanding, and metadata accessibility, all of which are paramount for heightening BI users' acceptance (Wang & Strong 1996; Foshay 2005; Foshay et al. 2007). As the quantity and complexity of corporate data has increased dramatically, and as data becomes more widely distributed throughout organisations, users at all management levels are required to make decisions in more responsive and dynamic ways (Shankaranarayanan et al. 2003). However, the perceived quality of data is affected by the way it is applied by users because the same data may be viewed in different perspectives by different people in different situations (Shankaranarayanan & Cai 2006). If users of data interpret the information incorrectly then there may be severe consequences to the business of an organisation. Thus, it is impera-

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