

# Positioning Database Content in a Business Intelligence Context

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## Abstract

This presentation defines and discusses the role of a course that positions database-related content into a business intelligence context. The definition of the course is predicated on the dissection of BI as a spectrum of techniques – techniques that apply to all disciplines but that are particularly relevant with respect to BI-related marketing courses. The methods and content employed in BI-related marketing courses (as well as in other BI-related courses) often tend towards the statistical and predictive end of the BI spectrum of techniques. However, the BI-framed course described here is defined by the techniques employed at the other end of the BI spectrum – those related to data access and reporting – techniques such as ad hoc querying and online analytical processing (OLAP). These techniques are more closely aligned with the content of a course that is focused on database management and data summarization and presentation, rather than with the content of a course that is focused on data mining and/or statistical analyses. An OLAP-focused data summarization course relies on concepts and techniques that can be readily investigated by tools such as Microsoft Access (and specifically “Group By” querying); Microsoft Excel (and specifically “Pivot Table” analyses); and Google Analytics (and the use of dashboard-generated analyses). The implementation of such an OLAP-focused marketing course is described.

**Keywords:** database concepts, business intelligence, online analytical processing, data summarization, marketing courses

## 1. BUSINESS INTELLIGENCE: REPORTING VERSUS ANALYTICS

Business intelligence (BI) is an umbrella term that encompasses a wide range of technologies and analytical techniques that are used to support decision making. The range of BI techniques can be grouped into two categories (Davenport and Harris, 2007): analytics and reporting. On one end of the BI spectrum, business analytic techniques include statistical analysis and predictive modeling; and they are concerned with processes such as forecasting, extrapolation, and optimization. On the other end of the spectrum, BI reporting techniques include the use of structured (pre-defined) reports as well as ad hoc querying and data

drill-down. These BI techniques are concerned with addressing questions about what happened (i.e., how much, how often, when, where, etc.), and thus are geared towards data summarization such as that which is characteristic of online analytical processing (OLAP) tools.

## 2. BI-RELATED MARKETING COURSES

While higher education may have given little attention to the BI field in the past, recent programs (Sircar 2009) are attempting to change that. At the same time, many BI-related courses have been and continue to be a part of various business curricula. In the field of marketing in particular, courses related to

data mining, marketing research, and database marketing are not uncommon. However, these types of BI-related marketing courses often tend towards the statistical and predictive end of the BI spectrum of techniques. Quite obviously, data mining courses focus on an analytics-based tool set driven by statistical concepts. Similarly, although the more broadly-defined area of marketing research is concerned with data collection (and not just data interpretation), courses in marketing research collectively (albeit without uniformity) also emphasize the use of statistical tools and analyses (Stern and Tsang 2002).

The third aforementioned BI-related course – database marketing – perhaps is best positioned to cover BI topics on the other end of the spectrum. Like marketing research, database marketing is broadly defined, with an overall focus on the segmentation and targeting of customers. Despite the compatibility of this course to OLAP-style data summarization, a relatively recent study (Teer, Teer, and Kruck 2007) of database marketing courses showed that while all of the surveyed courses covered database creation, only half of them employed a hands-on database project, and none of them covered OLAP topics. Moreover, nearly all of them covered statistical topics (to varying degrees); and at least half required statistics and/or marketing research as a prerequisite. Ultimately, database marketing courses allow for topics spanning both categories of BI techniques; but rather than taking advantage of OLAP-style database and summarization tools, they instead gravitate towards the statistical underpinnings of database marketing (perhaps reflecting on an explicit link to marketing research).

### **3. OLAP-STYLE DATA SUMMARIZATION**

Although OLAP usually refers to specific types of software and/or database tools, it also is more generally associated with a “slicing and dicing” style of analysis whereby data are summarized along different dimensions. Relevant to the reporting end of the BI spectrum, an OLAP-style analysis can effectively address questions pertaining to “how much” and “how many” across any and all dimensions of the data. In the general sense of slicing and dicing, data can be summarized via various methods and with various levels of complexity. From the analyst’s point of view, the treatment of the data can range from a system-controlled black

box in which the analyst need not understand the underlying data, to a user-controlled manual manipulation of the data whereby the analyst must understand the underlying data structures as well as the mechanics of the tools used to retrieve the data.

So on one hand, OLAP-style data summarization can be a rather simple process when powered by today’s dashboard-enabled interfaces. A tool such as Google Analytics, for example, utilizes a dashboard with a predefined set of queries whereby data summarization reports can be generated simply by selecting the dates and the variables (i.e., dimensions) of interest. In general, dashboards allow for the structure of the database and the mechanics of the queries to be treated as a black box that fully manages (and thus hides) the summarization process.

On the other hand, OLAP-style summarization via ad hoc queries can require a much more complex and detailed level of knowledge and skills. Relational database queries often rely on some understanding of database management concepts and the use and function of multi-table databases. While this knowledge base and skill set may be somewhat difficult to achieve for a non-technical analyst, database mastery can help to produce valuable summary information. With respect to Microsoft Access, for example, the complexity of “Group By” queries may make them somewhat underutilized; but nevertheless, they are quite value-added, particularly since they allow for an OLAP-style summarization along multiple dimensions of the data. Using such grouping techniques, queries can readily provide summaries that reveal the best and worst customers, products, brands, stores, periods, etc.

Having a level of complexity that lies between dashboards and relational databases, data stored in flat files also can be summarized using OLAP-style tools. For example, with a result similar to that which is produced by “Group By” queries, Microsoft Excel’s Pivot Tables allow for true-to-form OLAP-style summarization along multiple dimensions of the data. In fact, Pivot Tables actually reflect many of the features of OLAP tools. However, with a Pivot Table analysis, the data are stored in a single (flat file) spreadsheet (rather than in multiple tables); and as such, Pivot Table analyses do not require an understanding of multi-table querying techniques. Despite the

seemingly simplistic structure of the data, Pivot Table analyses can easily and powerfully produce summary reports and graphs along various and multiple dimensions of the data; and it can even allow for data drill-down as well.

#### **4. IMPLEMENTING AN OLAP-FOCUSED MARKETING COURSE**

With a focus on the above mentioned OLAP-style reporting and querying tools and techniques, a BI-related course can be positioned as a value-added part of a business curriculum. Such a course is particularly relevant to marketing curricula, even in curricula that already include data mining, marketing research, or database marketing courses. There are various points of discussion and lessons learned from multiple years of experience with such an OLAP-focused marketing course. The following provides for a general (simplified) listing of some of these points and lessons.

- While it seems logical to proceed from the simplest (dashboard-enabled) to the most complex (relational querying) data summarization process, the reverse order of topics has proven to be just as (and often more) effective.

- When presented in the following order, each of the tools used in the course (Access queries, Excel Pivot Tables, and Google Analytics) provide for mechanisms to circle back and tie into the preceding tools.

- The data analyses culminate in the summarization of information, a part of the process that requires educating the student about the logical, consistent, and organized presentation of the collective analyses.

- Data can offer analyzable categories or dimensions beyond the straightforward, as-is use of the existing columns or fields. This includes the differentiation between relative

and absolute information, as well as the use of functions that can produce new categories of information.

- Using OLAP-style techniques to construct a Recency, Frequency, and Monetary Value (RFM) analysis can present several learning opportunities, including: using queries within queries; the difference between counting and summing records; the complexities and errors associated with counting records; etc.

- For non-IS programs (such as marketing) that utilize a database management course, an argument can be made for an OLAP-focused course to replace a more traditional database management course.

The description of the course (including the use of specific example assignments) can provide insights into the possible fit and role of an OLAP-style course within business curricula.

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