

knowl·edge (n.)

The act or state of knowing; clear perception of fact, truth, or duty; certain apprehension; familiar cognizance; cognition. That which is or may be known; the object of an act of knowing; a cognition. That which is gained and preserved by knowing; instruction; acquaintance; enlightenment; learning; scholarship; erudition. That familiarity which is gained by actual experience; practical skill. Scope of information; cognizance; notice.

man·age·ment (n.)

The act or art of managing; the manner of treating, directing, carrying on, or using, for a purpose; conduct; administration; guidance; control. Business dealing; negotiation; arrangement. Judicious use of means to accomplish an end; conduct directed by art or address; skillful treatment; cunning practice. The collective body of those who manage or direct any enterprise or interest.



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Editor's Note

"Knowledge management" is another one of those phrases that mean different things to different people. Seems like we've all got some knowledge, and it would stand to reason that we'd want to manage the stuff. I appreciate the many and varied offerings by our guest contributors to this white paper. You'll find a good mix of articles, each taking a slightly different approach to the specifics and the applicability of KM. Enjoy, acquire knowledge and go forth to manage same!

Randi Mayes, Editor

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Business Intelligence (BI)

by Jim Flateboe
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What constitutes a business intelligence (BI) system? If you are currently producing meaningful management reports out of your accounting system or you occasionally run an ad hoc SQL analysis to answer a specific question regarding billing or collections, then you already have the beginning of a BI system. The difference between these simplified examples and a true BI system is one of degree, ease of use, response time, the availability of advanced business metrics and particularly the flexibility to design your own presentations.

In brief, a business intelligence system extracts information from your accounting and other systems, refines and transforms it where necessary and finally aggregates it into a flexible format useful for making strategic business decisions.

No doubt you've already noticed the propensity of the IT community to coin new jargon in an attempt to displace older, already-understood terms. You will find a BI system referred to by a multitude of names, including but certainly not limited to the following: Executive Inquiry Systems (EIS), Decision Support Systems (DSS), OLAP (Online Analytical Processing), ROLAP, MOLAP, Management Information Systems (MIS), Data Warehousing, Data Marts, Data Mining, Multi-Dimensional Analysis, Multi-Dimensional Cubes, Executive Dashboards, Management Scorecards and Knowledge Management. Good luck! But the terminology you favor is irrelevant as long as the end result is obtaining the information you need to manage your business.

What Makes a BI System Successful?

The attributes of a successful BI system are: **effectiveness, sound data base architecture, efficiency, accuracy, flexibility, minimal training requirements, and rapid deployment.** They are provided to assist you in determining whether you need a BI system and if so, how you might evaluate your alternatives. Aside from the first, they are not necessarily listed in order of importance.

Effectiveness

A successful BI system must first and foremost meet the overall objective of providing the right knowledge in an appropriate style to proactively support both strategic and tactical business decisions. It must efficiently transform the mounds of data stored in your accounting system into information specifically designed to help you gain new intelligence about your business and ultimately become more profitable when used in conjunction with sound judgment, prior experience and business intuition.

Executives must be able to easily monitor the firm's key performance indicators (KPIs) such as profitability, realization and billing lag and identify both unacceptable and desirable trends and seasonalities. Optimal system effectiveness enables users to do the following:

- “Slice and dice” business metrics by various dimensions and time frames on a calendar or fiscal basis.
- Drill up into more highly summarized data or drill down into more detailed presentations.
- Compare periods side by side in the presentation style most appropriate to the audience, including grids, charts, reports and spreadsheets.
- Easily identify the firm's top 100 clients for profitability and the bottom 10 billing timekeepers for slow billing.
- Determine which practice groups have high profit margin percentages with billing levels that can be expanded.
- Add new KPIs as the management style of the firm evolves.
- Easily generate an ad hoc analysis of BI data.

And the users must be able to do all this without assistance from IT personnel!

Sound Data Base Architecture

Accounting System Design. Your accounting system should meet the requirements to be classified as an OLTP (Online Transaction Processing) system. Basically this means that a variety of financial transactions including time entry, billing and payments are entered throughout the business day that subsequently update a relatively high number of tables. Typically within

the span of a few seconds, the effect of each separate transaction immediately becomes available for inquiry and further use. The accounting system may also update a limited number of summary tables in real time (such as client, matter and working timekeeper metrics).

Your accounting system also needs to provide the majority of data used to build your BI knowledge database in an Online Analytical Processing (OLAP) architecture. Consequently, a time and billing system must be designed to provide more than just its primary burden of efficiently performing accounting and financial functions. It must further provide the breadth of data to be manipulated and summarized into an architecture specifically designed to support strategic business decisions. And it must be developed to transfer and transform its millions of rows of OLTP data into an OLAP summary architecture repeatedly and efficiently.

Some of the attributes of a sound OLTP accounting design are obvious. The integrity of the data is foremost. Inaccurate accounting data does not serve well as the basis for BI. Next comes breadth or completeness; the more dimensions available for slicing and dicing, the better. And the more of these dimensions that are date effective the better. The more metrics (measures) available for aggregation and analysis the better. The more dates that are tracked in the accounting system the better.

The most commonly used dimension for BI analysis is time. The most atomic unit of time available in the aggregation process is called the granularity of time. A BI system should allow a choice of several time granularities including monthly, quarterly and yearly on either a calendar or fiscal basis. Users should also be able to track appropriate business metrics on a worked date, billed date, applied date and reversed date basis. For example, if you were interested in billing realization for 2001, you would want to view this KPI on both a worked-date and billed-date basis. The former would include an analysis of all billed fees *worked* during 2001 (any date billed) while the latter would include all fees *billed* during 2001 (any date worked).

It is also critical to handle bill and payment reversals very accurately, especially if your BI system is used for attorney credit purposes. Ideally you should be given the option to include or skip bills and payments that have been reversed. If you then opt to include reversals, the date billed and date reversed must be handled as separate transactions. For example, examine a hypothetical fee with an original value of \$200 worked on December 10, 2001, billed with a value of \$150 on January 7, 2002 and then subsequently reversed on February 3, 2002. The monthly granularity metrics must be adjusted as follows: the December 2001 worked value metrics increased by \$200; the January 2002 billed value metrics increased by \$150; and the February billed value metrics decreased by \$150. Once again, since the accounting system is the source of data for the BI system, its design must accurately maintain these various types of dates.

Sometimes a well-designed accounting system can be identified more easily by its lack of undesirable properties. Certain design principles should never be violated. Dimensional data (such as codes and timekeepers) must be strictly validated during transaction entry against a list of allowable values. Otherwise dimensional accuracy will be suspect when subsequently used for BI purposes. Also to be avoided is *data bleeding*, in which a dimensional data column is used to store dissimilar information. It's the familiar apples-and-oranges syndrome—an orange should not be stored in a dimensional data column intended for an apple. A common example of data bleeding is the use of dummy clients and matters in the accounting system to store firm administrative time not directly related to specific matters. The unfortunate result is that the end user must somehow constantly remember to exclude these dummy clients and matters from the many BI analyses to avoid distorting strategic information.

Dimensional data columns, which are not transaction-specific, should be stored in separate date effective tables carefully constrained to ensure contiguous but nonoverlapping coverage. For example, a poor database design might store the billing timekeeper in each of the millions of fee rows. It should instead be separately stored in its own table by matter with an appropriate coverage period. This is not only more space-efficient, it allows easy retroactive changes in a single place when the inevitable assignment errors are discovered. Similarly, dimensional data that is optional at transaction entry does not serve well for BI purposes since entry personnel will typically leave a significant percentage blank. Replication of dimensional data across multiple tables is also to be avoided (with a few exceptions to promote retrieval efficiency) since it introduces the possibility of synchronization errors.

Business Intelligence System Design. The database design principles for a BI system are not quite as apparent as for an accounting system. Obviously, accuracy and completeness are required. The prerequisite is accuracy and completeness in the accounting system. You can't make something out of nothing.

Many proprietary design techniques and principles compete for attention, all claiming to be most effective for aggregating and storing your dimensional and metric BI data. A thorough comparison of these is beyond the scope of this brief white paper. Once again it is perhaps easier to recognize a poor BI design. For example, if your BI system does not make it fast and easy to retrieve the KPIs you need today and in the future, then its design fails to meet its objectives. If your BI system cannot provide both calendar and fiscal basis analyses, then something is missing. If your aggregated BI data is any way encrypted or difficult to find or understand, then again it doesn't make the grade. If you can't label your KPIs by the names recognized in your firm, then an unwanted barrier has been erected in front of your executive users. If your BI system requires that you make an appointment with your IT staff each time you want to make a change to a presentation or create a new KPI, then . . . well, you get the idea.

Flexibility and ease of use are *absolute* requirements for an effective BI system, and are probably the most difficult rabbit for the BI designer and developer to pull out of the hat. Flexibility requires a more complex and deeper database design with dimensions and metrics not necessarily needed during initial deployment. It must also contain well-designed metadata (data about data) to transform the BI software output into the style of presentations most appropriate to your firm and even to individual user preferences. Ease of use is more a user interface issue in the presentation software (your IT people will talk about "UI"), but is impossible without a well-designed BI database.

The BI system must also be designed to carefully restrict access to sensitive business information. Specific users must optionally be granted access only to those dimensions such as office or practice group for which they have formal responsibility. Access to presentations that include sensitive KPIs such as profitability or realization must also be tightly controlled and limited only to authorized users.

Efficiency

Fast Response Time. No one likes to sit and wait for information. If response time is slow, users will quickly lose interest and their analytical thought process will be hampered, consequently, successful implementation of your BI system is jeopardized.

However, if the database is properly optimized and appropriate indexes used for maximum efficiency, then response time will be less than the psychological maximum, which is about four or five seconds for predesigned and ad hoc queries of the summarized BI tables.

Fast response time is also a by-product of proper network and application software design. In a client server architecture, a *thin client* model is the most efficient. In this model, the server, the much more powerful computer, provides the heavy-duty data manipulation and metric calculations in Structured Query Language (SQL) while the client (say, your PC) primarily handles the presentation duties.

Building BI Multi-Dimensional Summary Tables. In addition to rapid response time during the BI users' business day, the process of extracting, loading and aggregating your business metrics and KPIs into multi-dimensional summary tables must similarly be efficiently designed. The bulk of this BI building process occurs on a scheduled basis during the off-peak hours of nights and weekends. However, this off-peak window for BI processing is limited and a great deal must be accomplished to turn your accounting data into useful BI information.

Since the time frame covered by your BI summary tables typically spans several years, it's very efficient to have the option to periodically refresh your summary tables for only the more recent months. However, in the event you make any significant accounting adjustments to prior months, a full refresh must be available as well.

The concept of filtering is a very efficient technique for producing your various multi-dimensional BI analyses. This is characterized by transferring and aggregating the detailed accounting data ideally just once during the refresh process since this step is the most complex and intensive and therefore the most time-consuming. It is much more efficient to use a single summarized data mart as the filtered source for multiple analyses rather than repeatedly going back against your detailed accounting transactions. This technique is not only significantly faster but also reduces undesirable contention for resources with your accounting users.

Accuracy

I have already mentioned accuracy as a necessary attribute of an effective BI system under the topic of database design. It's hardly controversial to highly value data integrity in the accounting system as a prerequisite to accuracy in the BI system it feeds. Such accuracy cannot be gained without hard work and solid design architecture, and there are certain guiding principles that must be followed. For example, the strict validation of dimensional data at transaction entry is an absolute prerequisite for accuracy.

However, attention to accuracy is also required within the BI system and its various available presentation styles. Without the availability of SQL, the data manipulation language of BI systems, the designer could not attain such a high degree of accuracy (and flexibility, whose virtues form the topic of the next section). As stated earlier, it is very efficient to use a single summarized data mart as the source for building multiple BI analyses rather than repeatedly going back against your accounting system. Fortunately, this technique is also more accurate and consistent, as the data mart represents a static source of repeatable, reusable information. In contrast, the accounting system is a *twinkling* database, meaning that it's a moving target subject to constant change.

Flexibility

Once your BI system is installed, your overall satisfaction may hinge more on its flexibility than on any other property. You will probably start your BI journey using the standard presentations that should be available upon implementation. However, as you begin to discover the types of analyses that are suddenly possible to create, your expectations will increase significantly. You will want to customize your presentations to the dimensions,

KPIs and style best suited to your firm. Your BI system must support this growth as you gain proficiency, not hinder your rapid transformation into a power user.

Flexibility begins with the availability of rich sets of dimensions (including time) and measures from which to choose in your analyses. You should be able to easily set up a wide variety of drill-down dimensional hierarchies to satisfy various analytical needs. You should be able to leverage the existing measures to produce new meaningful KPIs. These new, user-definable measures should be permanently labeled to suit your needs and expand the stable of metrics available for use anywhere in the BI system.

Once you have established rich sets of dimensions and measures, the presentation style becomes critical. You must be able to easily copy an existing presentation, make any necessary changes to its content, look and feel, colors, and chart types and permanently establish it with a new name. A choice should be offered between screen presentation such as grids and hard-copy results such as Excel spreadsheet printouts. Once you have developed a new screen presentation or hard-copy Excel analysis, you should be able to assign a name to it and store it for repeated use.

Flexibility is enhanced when the user has a choice among a variety of filters to limit the data included in the presentation to selected date ranges and selected dimensions such as fees, hard costs, soft costs or firm time. Sometimes a dimension such as *Clients* will have too many members to effectively scroll through on a screen. Here, a set of top N analyses should be available so you can more easily scan through your top 100 clients based on billing, profitability or whatever measures you choose. An on-the-fly choice between calendar and fiscal basis should also be available for various time granularities such as monthly, quarterly and annually.

Minimal Training Requirements

As noted, poor response time is a significant barrier to effective implementation of a BI system. Similarly, initial training of your executives in the use of the BI system must be accomplished in an hour or less if their focus and interest is to remain high. You want your business policymakers using the system's strategic information, not spending their time and patience looking for it. The user interface must be intuitive and easily mastered especially for occasional users. Power users typically gain proficiency quickly with continued use and will be looking more for analytical depth in the BI products, but only once they have the initial access and navigation skills down pat. Contrary to popular opinion, a Windows-based BI application is not automatically easy to use, efficient or well designed. Windows compatibility just guarantees it will run on your desktop PC in color.

Rapid Deployment

Today's law firm is faced with an ever-changing multitude of high-priority projects all competing for resources of time and personnel. The best way to steal momentum from a BI project is to make it slow to deploy and require senior-level IT staffing for implementation. Fortunately, a BI solution is additive to your accounting system and effectively sits on top of it. And since it can also be regenerated at any time, a BI system is typically much easier than a financial system to launch. A properly designed BI system can start modestly and evolve over time to meet your expanding needs for strategic business information. It should come with a starter set of pre-defined presentations that can be easily customized to fit your purposes and audience. It is much easier to change an existing presentation's style, dimensions and KPIs than to generate a new one completely from scratch. In general, deployment of a BI system should take less than a month.