BUSINESS ANALYTICS FOR MANAGERS

Taking Business Intelligence Beyond Reporting

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Contents

CHAPTER 1

The Business Analytics Model

The most important thing in a large and complex project with a large number of people and competencies involved is to create an overview of the project from a helicopter perspective as quickly as possible.

This chapter focuses on the business analytics (BA) model, which will help you get that overview. The model provides an outline for understanding—and creating—successful business analytics in any type of organization. The purpose of the model is to give the organization a single common frame of reference for an overall structure in the creation of successful BA, and it clarifies the roles of the individual contributors and the interaction in the information generation and information consumption process, which is what BA is, too. The model is the pivot of the rest of the book, and the five layers of the model are subsequently explained in detail with each layer allocated a separate chapter.

If your job is to make an information strategy, for example, as a CIO, the model comprises all the stakeholders and processes you should focus on. The model also gives clues about why most BA projects fail, which is simply because it is a large cross-organizational activity. You can compare it to a chain that is only as strong as its weakest link and if one of the departments involved is incompetent or if the knowledge handover between departments fails, your project will fail.

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OVERVIEW OF THE BUSINESS ANALYTICS MODEL

The BA model in Exhibt 1.1 illustrates how business analytics is a layered and hierarchical discipline. Arrows show the underlying layers that are subject to layers above. Information requirements move from the business-driven environment down to the technically oriented environment. The subsequent information flow moves upward from the technically oriented environment toward the business-driven environment.

As illustrated by the BA model in Exhibit 1.1, there are many competencies, people, and processes involved in the creation of BA. In the top layer of the model, in the business-driven environment, the management specifies or develops an information strategy based on the company's or the business area's overall business strategy. In the second layer, the operational decision makers' need for information and knowledge is determined in a way that supports the
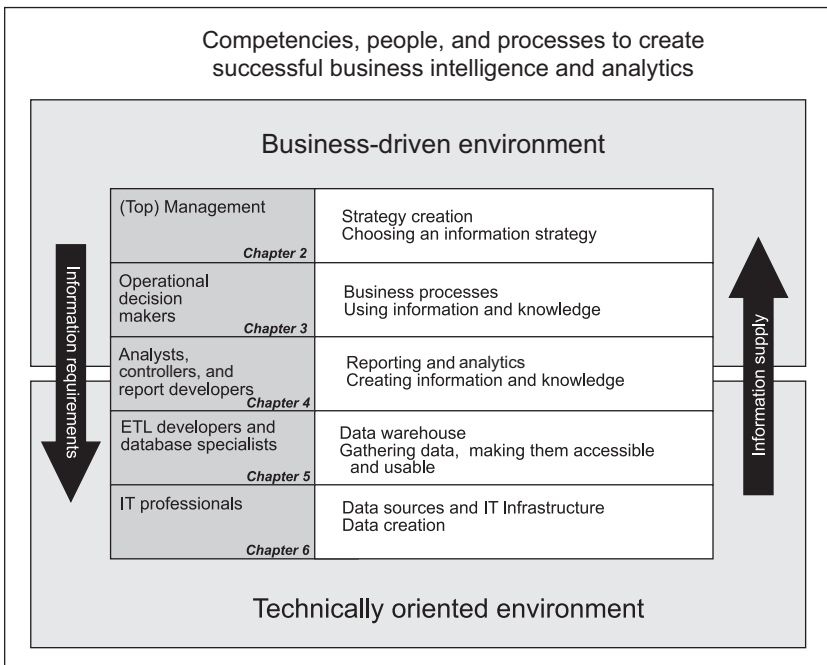

EXHIBIT 1.1 The Business Analytics Model

company's chosen strategy. In the middle layer of the model, analysts, controllers, and report developers create the information and knowledge to be used by the company's operational decision makers with the purpose of innovating and optimizing their day-to-day activities. In the second layer from the bottom, in the technically oriented environment in the data warehouse, the database specialist or the ETL (extract, transformation, load) developer merges and enriches data, and makes it accessible to the business user. In the bottom layer, in the technically oriented environment, the business's primary data generating source systems are run and developed by IT professionals from IT operations and development. Successful BA processes should have a fixed structure, which always begins with the specification of the information strategy, which is derived from the objectives of the business strategy.

Strategy Creation

All underlying contributions and activities must submit to the chosen information strategy, as specified in the business-driven environment at the top. The information strategy is decided at this level based on the organization's or the business area's overall business strategy (vision, mission, and objectives). Normally, these strategies will result in a number of key performance indicators (KPIs) with the purpose of measuring the degree of progress and success. The contents of the KPIs will depend on which underlying business process we want to control. The KPIs could, for instance, relate to profitability, return on equity (ROE), or different types of sales targets. The information strategy is often specified by the top management of the organization, by functional managers or business process owners. Large organizations may have an actual business development function, which is responsible for the formulation of the strategy for the entire group. How this is undertaken will be explained in detail in Chapter 2.

Business Processes and Information Use

Once the strategy, along with the overall strategic KPIs, is in place, a framework, focus, and objectives are established for the operational

business processes and initiatives. The information and analyses shown in the underlying layers of the model must be directed at changing and managing business processes toward the strategic objectives made visible by the KPIs. The operational decision makers' desired behavior and the subsequent information and knowledge requirements to bring about this behavior are specified and outlined in this layer.

As mentioned, the objective of BA initiatives is to change business processes and actions so that they are targeted toward achieving the organization's strategic objectives. For example, operational decision makers from sales, marketing, production, general management, HR, and finance can use information and knowledge to optimize their daily activities. In Chapter 3, we'll look at what this means specifically for the various functions of the company.

Types of Reporting and Analytical Processes

In the analysis and reporting development environment in the middle of the model, analysts specify which information and data are necessary to achieve the desired behavior of operational managers in the business environment. This is where information and knowledge are generated about the deployment of analytical and statistical models, which are used on data from the data warehouse. The requirements for front-end applications, reporting, and functionality are also specified in detail here, all with the purpose of meeting the demands from the higher layers and levels of the model. Note that the analysis and reporting development environment is placed in the bordering area between the business-driven and the technically oriented environment, and that the team in this area usually has competencies in both areas. Chapter 4 covers more about the methodical work in the analytical and reporting environment.

Data Warehouse

Database specialists and ETL developers receive requirements from the analytical environment about data deliveries. If the required data is already in the warehouse, the process will be to make this data accessible to the front-end applications of the business. If data is not stored, the

data warehouse will need to retrieve data from one or more operational data sources in the organization's environment. Alternatively, data can be purchased from an external supplier, or the IT department may be asked to implement a new infrastructure with a view to create a new operational data source. Chapter 5 focuses on methods and systems for storing, merging, and delivering data.

Data Sources: IT Operations and Development

Information technology operations and development must meet the requirements from the data warehouse about the delivery of data from the primary operational data sources or the development of new data sources. The different primary data sources in a company's environment and the data created are covered in Chapter 6.

As previously noted, a large number of people, competencies, and processes are involved in the creation of BA. Large organizations sometimes have several hundred people on all levels involved at the same time. In smaller companies, controllers and analysts must have a wide range of competencies to be able to carry out BA initiatives on their own.

It is important to realize that if something goes wrong in one of the layers of the BA model, the investment in BA may well be lost. If the management, in the top layer of the model, does not define one overall strategy, operational decision makers will not have a goal to work toward. The analyst won't know which analyses are required. It makes a big difference, for example, for the analyst to know whether the overall target is for the business to show a profit of $1.3 million after taxes, or whether the target is to be perceived as the most innovative enterprise—the two different targets require a completely different analytical approach and information deliverables. In data warehousing, the database specialist and the ETL developer won't know which data sources to retrieve, merge, enrich, and deliver to data marts (data prepared in the data warehouse for business use). Information technology operations and development won't be able to contribute by creating new data sources, since they don't know which new information and knowledge is required by the business. In other words, the whole thing becomes a messy affair without focus. One way of avoiding

such a chaotic situation is to create a business intelligence competency center (BICC), perhaps as a virtual organizational unit. We'll take a closer look at BICC in Chapter 7.

DEPLOYMENT OF THE BA MODEL

Of course, this is what we've always been doing or tried to do—but it's the first time I am able to put it into words and see our endeavors in a useful analytical model.
                                            —Program manager for a large radio station

Case Study: How to Make an Information Strategy for a Radio Station

Now that we've introduced our theoretical model, let's apply this information to a concrete example in order to understand it better. This case study features the BA initiative of a large radio station that broadcasts nationwide. The case study is a simplified and somewhat creative version of real events, and its objective is merely to outline a BA process. Focus is on the helicopter perspective, an improved conceptual tool, and the first important insights. The case study relates to the BA model in Exhibit 1.1.

Overall Strategic Targets of the Business

The radio station's vision is that there is a demand for radio entertainment in the shape of good music, entertaining talk, and news. Its mission is to become a leading player in the national market. The station's specified business goal is a market share of 25% and a return on equity (ROE) of 15%. The executive management cockpit or dashboard of the radio station with KPIs for monitoring business performance in relation to strategic objectives is illustrated in Exhibit 1.2.
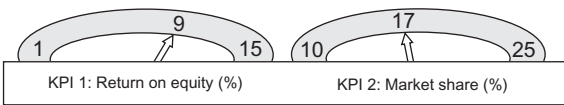

EXHIBIT 1.2 Executive Management Cockpit of Radio Station with KPIs Prior to BA Initiative

The current status, which can be read from the instruments in the executive management cockpit, is an actual ROE of 9% and an actual market share of 17%. So the station has a way to go in order to achieve its targets of an ROE of 15% and a market share of 25%. The business strategy and objectives are thus presented by means of the following metrics (measures) or KPIs. Note that success and good performance are derived from the actual values of these measures in relation to the objectives.

$$Goal(KPI\ 1): ROE = 15\%.\ Actual = 9\%$$

$$Goal\ (KPI\ 2): Market\ share = 25\%.\ Actual\ 17\%$$

The two KPIs are used to control and manage the radio station. Return on equity (KPI 1) is the most important KPI, and it is affected by the market share (KPI 2). The thinking is that a bigger market share (KPI 2) will mean more concurrent listeners and increased advertising revenue, which means a bigger ROE for a given level of cost. A new BA initiative is planned and implemented in the business. The process is outlined in the following section using the BA model.

Functional Strategy and Business Case

Business analytics activities must always be based on the business-driven environment, with the management specifying or creating one single information strategy, which must be subject to the company's overall business strategy (vision, mission, and objectives).

The Program Manager has come up with a strategic initiative to increase the business's market share from the current 17% to 25%. The radio station must hold on to its listeners longer. The Program Manager specifies this strategy as: "From our current record of holding on to our listeners for 15 minutes, before he or she changes channel, we must in the future hold on to our average listener for 30 minutes." The Program Manager introduces the performance target: average listening time as a new measure or KPI for the production department and the target is that the average listener must be kept on the broadcasting frequency for 30 minutes. The average listening time thus takes its place as a new KPI on the management dashboard.

$$Target\ for\ KPI\ 3: Average\ listening\ time = 30\ minutes.$$

$$Actual = 15\ minutes$$

Note that this strategic target penetrates right into the core business of the radio station. If the target—to hold on to the average listener for 30 minutes—is achieved, it will mean a bigger market share, increased advertising revenue, and, ultimately, an improved ROE. So, it is expected that an increase in KPI 3 will affect both KPI 2 and KPI 1 positively.

Before launching the BA initiative, the Program Manager prepares a business case for the project. He expects a larger market share (KPI 2) of up to 25%, as a result of the increase in average listening time (KPI 3) of 30 minutes. This is expected to improve the pricing of advertising slots, so that the advertising revenues of the radio station increase by $4 million per year. Based on these expectations, he calculates that return on equity (KPI 1) will increase from 9% to 13%. In addition, he expects that the BA initiative will incur a resource consumption of three employees in four months as well as necessitate purchasing software and consultancy services for $250,000.

Total costs are estimated to be $1 million. The business case speaks in favor of carrying out the project. The reason is an expected growth in the annual cash flow of $4 million from increased advertising revenue, and that the project will cost only $1 million to implement.

Moreover, the payback period is only one quarter and the project is not considered to entail any risk. Note that if the business case had shown a negative result (or if the project had looked risky), the BA initiative should not be implemented. Business cases are a good way of evaluating and prioritizing BA projects. We'll cover more about business cases in Chapter 8.

The management of the radio station now has the first elements of its information strategy in place, and it's directly related to the overall strategic objectives of the business.

Business Processes and Actions

The business processes of the production department must now be adjusted in such a way that they actively show a behavior that secures the average listener for longer, thereby increasing the value of KPI 3.

There is an acknowledgment among the staff that they need more information and knowledge about their listeners' characteristics and

preferences at different times and in connection with the different programs. In other words, the processes must be adapted to a listener profile, to enable the DJs and newsreaders of the radio station to continuously deliver content that is to the current listeners' tastes. In the future, the radio production must be based on factual knowledge about the current listeners' characteristics and preferences. This means that whatever is broadcasted must be customized to suit current listeners' interests, and results must be measurable on an ongoing basis and readable on the management dashboard—now with the three measures or KPIs: KPI 1: return on equity, KPI 2: market share, and KPI 3: average listening time.

Analytical Processes and Front-ends

In the analytical environment, it is the task of the analyst to create information and knowledge to drive business processes in the direction of delivering content that, to a greater extent, falls into the listeners' tastes. The main questions for the analyst are:

- Who are our listeners?
- What do they like to listen to?
- Who listens to what and when?

The analyst quickly realizes that he does not possess sufficient data about the listeners to be able to work out listener profiles. If he did have this data, it could be merged with the program database of the radio station in the data warehouse, and subsequently constitute the basis of the creation of knowledge about listener profiles at different times and for the different programs of the radio station.

Data Warehouse

The analyst needs the data warehouse to provide him with data on the listeners' ages, genders, and tastes and preferences 24/7. He needs this information for the profiles. The database specialist does not have this data stored, and it cannot be obtained from an external supplier. Therefore, the database specialist asks the IT department to create a

new operational data source to collect data on listener profiles at different times of the day.

Data Sources: IT Operations and Development

Information technology operations and development decide to collect data on the listeners' ages, genders, tastes, moods, and listening times via a questionnaire. They develop an electronic questionnaire that listeners can complete on the radio station's Web site. The survey is announced and promoted on air, and sponsor prizes are given out via a prize drawing for the participating listeners. The data-collection process enables the creation of new operational data sources in the technically oriented environment, and the process is controlled and managed by developers and operational staff from IT operations and development. Using ETL tools, the database specialist or the ETL developer now continuously transfers the new data source into the data warehouse. Here it is merged with the other databases of the radio station (for instance, the database on past aired radio programs). After having been merged, the data is moved out into a data mart area so that the analyst can access them.

In the analytical environment, the analyst now has access to data and starts to transform the collected and merged data from the data warehouse into information and knowledge. The result of his analytical processes using statistical methods and tools such as data mining shows that the typical listener in the early hours of the morning is a fun-loving 30-year-old woman.

The analyst also has report-developing competencies and has prepared a front-end report with the results from his BA tool, which could be Microsoft Excel. The report contains information and knowledge about listener profiles for different times of the day and for the different programs. The report is released weekly with new numbers to the business's intranet, where it can be accessed and used by business users in the production department. Note that the analytical environment is positioned in the border area between the technically oriented environment and the business-driven environment, and we find people with competencies in both areas. The front-end solution and the report could also be delivered by a report

developer from the technically oriented environment, based on results from the analytical processes.

The radio station's operational decision makers, DJs, and newsreaders must now change their daily business processes and actions in such a way that their actions provide better support for the achievement of the strategic targets of the business. As mentioned, the strategic target for the production department is to hold on to listeners for longer with a view to increase market share and ultimately improve return on equity. In the morning, they all read the released front-end report to make use of the information and knowledge from the controller's analytical processes. Before each DJ puts on a song, he looks at the BA report and asks himself the question: Is a fun-loving 30-year-old woman going to like this music?

If he's about to play a heavy metal CD, it'll probably go back on the shelf. Instead, "Material Girl" by Madonna stands a good chance. Equally, all news will be sorted through by the newsreader. Before reading any news, he now asks himself the question: Is a fun-loving 30-year-old woman going to find this piece of news interesting?

If the news is about motoring, it'll probably end up in the paper bin, whereas news about either the current economic crises or the latest cinema film is likely to be broadcasted.

What is happening on this radio station is business analytics. Decision support delivered to operational decision makers based on data analysis (creation of knowledge). The purpose of the exercise is to direct the decision makers' daily business processes toward achieving strategic targets.

Evaluation of the BA Process

Over the next six months, the radio station succeeds in holding on to its average listener for 9 minutes longer than before and all three KPIs are improved. (See Exhibit 1.3.)
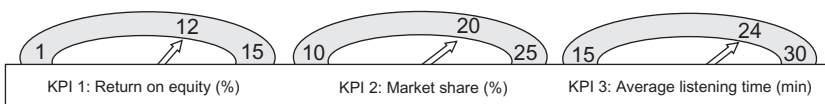

EXHIBIT 1.3 The Radio Station's Dashboard with KPIs after BA Initiative

Following the BA initiative, the radio station's average listener stayed tuned in for an average of 24 minutes (KPI 3). The radio station's market share (KPI 2) went up to 20%, and return on equity (KPI 1) increased to 12%. The business is on its way to achieving its overall strategic targets, and the production department's BA initiative must be said to have been successful. It could not have been done without BA—from strategy to data sources.

CONCLUSIONS

The purpose of the case study was, as mentioned, to provide a quick overview and to show how BA can be deployed successfully to support and influence the behavior of operational decision makers with a view to achieving overall business targets.

The 12 most important conclusions to draw from the case study in terms of the establishment of successful BA are:

- The BA initiative of a business area or a department must support and promote the department's overall strategic targets, which equally must support and promote the overall strategic targets of the business as a whole. We will take a closer look at the relationship between business strategies and the BA function in Chapter 2.

- The strategic targets of the BA activities of a given business area must be measurable with one or more KPIs to ensure that performance and progress can be followed on an ongoing basis. The chosen KPI, or KPIs, must be able to influence the overall KPIs of the company. More about KPIs in Chapter 3.

- A planned BA activity must stand up to an evaluation based on business case principles. In other words, a BA initiative must create value for the company just like any other investment. Increased revenue or savings must justify the investment. More about business cases and the prioritization of BA projects in Chapter 8.

- It must be specified what kind of information and knowledge are required for the operational decision makers, and how they

are to act on this information. This part needs to be taken very seriously. It's important to understand that it is here and only here, in the process-changing area, that BA creates value for the company. In all other contexts, BA is just a cost. More about this subject in Chapter 3.

■ The analyst/controller must be able to decode business users correctly, and specify the requirement for relevant data and use the right methods, so that useful information and knowledge are presented for decision support. Front-end applications and reports conveying knowledge must have correct functionality and be simple and intuitive for business users. More about analyses and reporting methods in Chapter 4.

■ The data specialist or the ETL developer in the data warehouse must be able to merge and enrich data with useful dimensions and perspectives. Data quality must be very high to ensure credibility from the business side. More about data warehouse and data quality in Chapter 5.

■ Information technology operations and development must be able to establish an infrastructure for new data sources and secure valid retrieval of source data. More about data sources in Chapter 6.

■ The achievement of BA in large organizations is a process that involves contributions from many functions and people. The BA model provides a helpful overview of structure, people, and activities. So it's necessary to use it in the planning stages of BA initiatives. It may help to create an organizational function to handle BA activities across the functions of the organization to ensure the necessary coordination. More about the organization of BA in Chapter 7.

■ The analyst/controller will typically be a key person in BA activities and represent a kind of cross-functional person holding all the strings together. This is because of his or her presence in both the business-driven environment and the technically oriented environment (refer back to the BA model). The analyst will usually have the necessary insight into processes and strategies in the business-driven environment as well as the necessary

technical insight to be able to enter into a constructive dialogue with the data warehouse and IT department.

- Business analytics is a holistic and hierarchical discipline, stretching from business strategies to sourcing from operational data sources. The business-driven environment must assume full ownership and manage the process. The technically oriented environment must support the process with infrastructure, data delivery, and the necessary application functionality.

- Business analytics is a support process. It can be seen as a chain that is only as strong as its weakest link. If, for instance, the analyst cannot derive the right information from data, then all other activities are of no use. The same is true if we do not deliver the right data to the analysts, or if the business users chooses not to act based on the new knowledge. In Chapter 8, we take a closer look at what to be aware of as project manager of a BA project.

- Successful BA processes should have a fixed structure, which always begins with the specification of the information strategy, which is derived from the objectives of the business strategy. Sketching an information strategy of the radio station using the BA model is visualized in Exhibit 1.4.

EXHIBIT 1.4 Sketching an Information Strategy

Who	What to Do	Radio Station Example
Executive management function CEOs	Executive management sets overall strategic targets for the business.	Executive management sets overall business targets: Return on equity (KPI 1) = 15% Market share (KPI 2) = 25%
Business function Functional managers/ directors and operational decision makers in HR, sales, production, marketing, finance, etc.	Functional managers/ directors set strategic target at the functional level.	Program Manager sets target; Average listening time (KPI 3) = 30 minutes
	Operational decision makers improve upon business processes using information created by the BA function.	DJs and newsreaders improve their processes by broadcasting music and news in accordance with listeners' tastes at different times of the day.
	Operational decision makers demand and use information.	DJs and newsreaders demand information about listeners' tastes/profiles at different times of the day
BA function Analyst, controller, data manager, and report developer	Identify business requirements and create information using analytical methodology.	Analyst identifies listeners' profiles at different times of the day by using data mining methodology, and report developer creates reports.
Data warehouse function ETL developer and database specialist	Gather, enrich, and supply data for business use, based on requirements from analyst.	ETL developer and database specialist gather, enrich, store and deliver data on the listeners' age, gender, tastes, moods, and listening times, based on requirements from analyst.
Data source and IT infrastructure function IT professionals	Maintain and develop IT infrastructure for data to be created.	IT professional creates new source data by developing an electronic questionnaire on the Web site to be completed by radio station listeners, based on requirements from the data warehouse team.

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BA function Analyst, controller, data manager, and report developer	Identify business requirements and create information using analytical methodology.	Analyst identifies listeners' profiles at different times of the day by using data mining methodology, and report developer creates reports.
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