

Chapter 1

Surveying Microsoft Business Intelligence from 50,000 Feet

In This Chapter

- ▶ Getting a handle on Microsoft Business Intelligence
 - ▶ Looking at the components of the Microsoft BI core platform
 - ▶ Identifying Microsoft BI tools and features
 - ▶ Customizing and developing Microsoft BI capabilities
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If you cannot explain it simply, you do not understand it well enough.

— Albert Einstein

In the vast world of technology-inspired buzzwords and jargon, it's easy to get dazed and confused and give up hope. Business intelligence (which, throughout this book, I'll also refer to as simply "BI") is no exception; I recently heard a complaint that the alphabet soup of Microsoft BI terminology is downright overwhelming. Fear not! This chapter gives you a bird's-eye view of the products and capabilities that make up Microsoft Business Intelligence.

You also find out how to speak Microsoft BI and gain an understanding of these coded sounds and acronyms that make up the language. You can then decipher the hype and draw your own conclusions about the role Microsoft BI plays in your organization.

Introducing Microsoft Business Intelligence

I was once on a consulting team for a large telecommunications company's BI project, using advanced BI software tools from some of the top names in the field. Our client company had a massive data store with a ton of data. We

tried to build some very simple reports — but couldn't transform the data into what we needed. Getting that job done would take more than a year of bureaucracy and requests. We were stuck and desperate.

We met with a manager who was already turning out the kinds of reports we needed. He had a computer under his desk running a trial version of SQL Server — and was using that product's BI features to pull data from the database, transform it, and report on it. It was an eye-opening experience for me: This guy, with a free trial version of one Microsoft product, put together an impressive result while our team of professionals — highly paid, highly trained, using some of the best software on the market — struggled. The world just didn't seem right! From that day on, I vowed to figure out what Microsoft BI was all about; in this book, I share with you what I found out.

Knowing the components of Microsoft BI

Microsoft BI combines BI concepts with the built-in features of SQL Server, SharePoint, and Office products and makes those concepts happen. As Microsoft technology advances, the company has taken a head-on approach improving business intelligence — working relentlessly to make its products understandable and easy to use. The three mainstays of Microsoft BI are these primary components (illustrated in Figure 1-1):

- ✓ A core set of data tools and reporting features that are part of Microsoft SQL Server.
- ✓ The Microsoft Office products and SharePoint technology.
- ✓ A set of development tools that developers can use to customize and enhance Microsoft BI capabilities.

Figure 1-1:
The three
primary
components
of Microsoft
BI
technology.





Many organizations have already paid for the licensing that enables them to use SQL Server, SharePoint, and many of the Microsoft Office products. Before you worry about a large cash outlay for licensing, check with your company's IT department to find out if you already have the technology you need for BI!

Tracing the terminology

Having worked in consulting for many years, I constantly walk into new situations and corporate cultures where I'm bombarded with acronyms and terms that make little sense to me (at first, anyway). I've noticed that when a group of people work closely together and have a common goal, they can easily create what sounds like an alien language. Okay, I'm just as guilty as the next person. Working with a new client, before long I find myself shortening the names of systems and processes to acronyms and then shortened again to, um, utterances (they're not exactly "words" most of us would use in a conversation). Rattling off these sounds can baffle an outsider: "You should use SSIS to ETL into a data warehouse so you can use SSRS and SSAS to surface data to MOSS." Say what?! **Hint:** "Surface" is a verb here. The rest is in Martian. (Kidding. But just barely.)

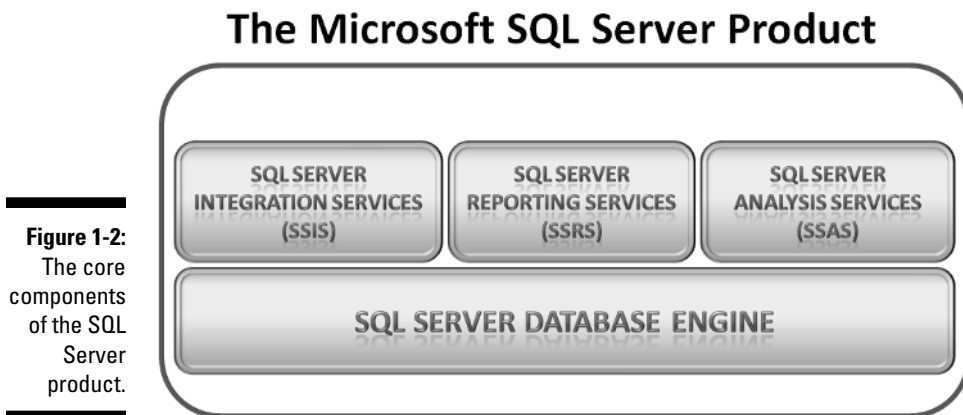
Here's a partial translation with some good news. Microsoft terminology often describes its products in terms of their specific features — until those features start to seem like separate products. So, for example, you may hear a lot about SQL Server Reporting Services (often shortened to SSRS, SRS, or even RS) and wonder whether you have to buy a separate license for it. Good news: You don't. SSRS is part of Microsoft SQL Server; if you own SQL Server, you already own this data-reporting capability. At the technical level, SSRS can send queries to gather data from other Microsoft products, as well as many different data sources that include such database products as Oracle, PostgreSQL, MySQL, TERADATA, SAP, and IBM DB2, just to name a few.

Microsoft has been sharpening its approach to business intelligence, consolidating products into an overall roadmap that simplifies the adoption and management of BI for its customers. For example, the company discontinued a former stand-alone product called PerformancePoint Server and added it to the latest release of Microsoft SharePoint. The term SharePoint is also often misunderstood. SharePoint will be covered in Chapter 10 but you should be aware that SharePoint includes many different features that often sound like their own products (and sometimes were their own products in a past life as is the case with PerformancePoint).

So, if you check with your IT gurus and find that your organization already owns Microsoft Business Intelligence technology, the next step is *implementation* — that is, getting it to do real work for you in your specific situation. All you need is an understanding of Microsoft BI concepts and functions — along with the technical skills to make them work for you — and the next section gets you started in that direction.

Getting to the Core of Microsoft BI

The core of Microsoft BI consists of the components that make up Microsoft SQL Server, as shown in Figure 1-2.



SQL Server started out as a database product but has grown to include additional capabilities that put core BI concepts into action. Table 1-1 outlines these core components and what they do.

Table 1-1	SQL Server Core BI Components
<i>Product</i>	<i>Description</i>
SQL Server Database Engine	The core program used to create standard relational databases, including data warehouses and data marts (detailed in the next section of this chapter).
SQL Server Reporting Services (SSRS)	Software for creating reports based on Microsoft (and nearly all other) data sources.
SQL Server Integration Services (SSIS)	Software for connecting to a multitude of data sources, transforming the data into a single useful format, and loading it into a Microsoft SQL Server database — all using the ETL (Extract, Transform, and Load) process detailed in Chapter 5.
SQL Server Analysis Services (SSAS)	A Microsoft version of OnLine Analytical Processing (OLAP, detailed in Chapter 8) that stores massive amounts of data in a special database called a Cube for very quick real-time analysis.

Date warehousing and data marts

Although computer systems help solve many problems in business, they use so many different kinds of programs that they can't always communicate easily with each other. A tremendous number of systems make up a modern organization — payroll, accounting, expenses, time, inventory, sales, customer relations, software licensing, and so on. Many of these systems have their own databases and ways of storing data. Combining data from the tangle of systems — let alone doing something useful with the combined data — becomes extremely difficult.

Business intelligence creates a “big picture” by storing and organizing data from many disparate systems in one usable format. The idea is to make the data readily accessible for reporting, analysis, and planning. A *data warehouse* is a central database created for just that purpose: making the data from all those sources useful and accessible for the organization. The idea is to give decision-makers the information they need for making critical business decisions.

A *data mart* is a more specialized tool with a similar purpose; it's a functional database that pulls particular information out of the overall Data Warehouse (or even directly from source systems depending on who you ask) to answer specific queries. For example, a manufacturing location may need to compile some specialized data unique to the process used to make a particular product. The overall data warehouse is too big and complex do that job (or to modify effectively to handle it), so a smaller version — in BI lingo, a data mart — can be created for this one manufacturing location.

The Microsoft SQL Server Database Engine manages not only data warehouses, but also data marts — and both types of data storage can become massive. Fortunately, SQL Server addresses this problem by storing one database across a cluster of many different servers. This approach accommodates the enterprise as it grows in scale.

Reporting on data

When you have a Data Warehouse, you likely don't want to look at rows and rows of data; instead, you want to visualize the data and give it meaning. Building reports that answer a particular question (or set of questions) means taking raw data and turning it into information that can be used to make intelligent business decisions. SQL Server Reporting Services (SSRS) — a component of SQL Server — builds reports by doing that bit of magic.



SSRS has features that can make your reports as fancy as you like — gauges, charts, graphs, aggregates, and many other snazzy ways to visualize the data. Check out more information on SSRS and reporting in Chapter 8.

Integrating data from many sources

The many different systems and processes that make up an organization create data in all shapes and forms. This data usually ends up stored in the individual systems that generated it — but without any standard format. Fortunately, SQL Server has a component — SQL Server Integration Services (SSIS) — that can connect to these many different data sources and pull the data back into the central data warehouse. As the data moves from the source systems to the Data Warehouse, SSIS can also transform it into a standard useful format. The whole process is known as *Extract, Transform, and Load (ETL)*, and there's more about it in Chapter 6.

Analyzing data

As you can imagine, the amount of data contained in a modern business is enormous. If the data were very small, you could simply use Microsoft Excel and perform all of the ad-hoc analysis you need with a Pivot Table. However, when the rows of data reach into the billions, Excel is not capable of handling the analysis on its own. For these massive databases, a concept called OnLine Analytical Process (OLAP) is required. Microsoft's implementation of OLAP is called SQL Server Analysis Services (SSAS), which I cover in detail in Chapter 8.



If you've used Excel Pivot Tables before, think of OLAP as essentially a massive Pivot Table with hundreds of possible pivot points and billions of rows of data. A Pivot Table allows you to re-order and sum your data based on different criteria. For example, you may want to see your sales broken down by region, product, and sales rep one minute and then quickly re-order the groupings to include product category, state, and store.

In Excel 2010 there is a new featured called PowerPivot that brings OLAP to your desktop. PowerPivot allows you to pull in millions of rows of data and work with it just like you would a smaller set of data. After you get your Excel sheet how you want it, you can upload it to a SharePoint 2010 site and share it with the rest of your organization.



With PowerPivot you are building your own Cubes right on your desktop using Excel. If you use PowerPivot, you can brag to your friends and family that you are an OLAP developer. Just don't tell them you are simply using Excel and Microsoft did some magic under the covers.

When you need a predefined and structured Cube that is already built for you, then you turn to your IT department.

Data mining

Computers can be programmed to sort through enormous amounts of data looking for patterns. It's an exciting new frontier that goes by many different names — in business, the most common ones are *data mining*, *predictive analytics*, and *machine learning* — but this book sticks to “data mining”. (Microsoft SSAS has a number of data-mining algorithms that I explain in detail in Chapter 7.)



The Microsoft data-mining algorithms are part of SQL Server Analysis Services, but you don't have to be a super computer ninja to access and use them. Microsoft offers a free Excel Data Mining Add-In that transforms Excel into a simple, intuitive client program for the SSAS data-mining algorithms (Chapter 9 has more about using Excel in data mining).

Microsoft BI Data Presentation

Microsoft provides BI data-presentation capabilities in its Office and Server products — mainly by consolidating stand-alone products into larger units that are easier to manage conceptually. For example, PerformancePoint Server (formerly a stand-alone product) became part of SharePoint as a feature called SharePoint PerformancePoint Services. Table 1-2 lists the Microsoft applications that do BI presentation.

Table 1-2 Microsoft Applications for BI Presentation

<i>Product</i>	<i>Description</i>
Microsoft Office Excel	Excel is an end-user desktop spreadsheet application that can contribute to BI throughout the journey data takes to becoming information, known as the data lifecycle. Excel has the ability to connect to the data warehouse, data Cubes, and other external sources of data and compile that data into charts, graphs, and other cool visualizations.
Microsoft Office Visio	Visio is an end-user desktop application for building flow charts and other diagrams. Visio has specialized templates for data mining.
SharePoint	SharePoint is a Web-based application that provides online collaboration and content management. Imagine SharePoint as an internal Web site, used for tasks such as storing documents, collaborating in real time, and viewing critical data about your company. SharePoint Web sites present the critical data housed on servers (those running Microsoft SQL Server as well as other backend systems such as SAP, Oracle, Dynamics, and custom developed solutions that have grown and been developed over the years) to users.

Microsoft Office Excel

As one of the most widely used Microsoft Office products, the Excel spreadsheet program is designed to organize, analyze, and visualize data. Excel is one of the most powerful desktop applications in the Microsoft BI arsenal.

An analysis tool for everyone

Excel is such a popular data tool that most of the client organizations I visit use it to run some critical portion of their business. One good reason is that Excel can be installed on a local computer with no need for administrators and servers.

The Data Mining Add-in

Microsoft creates Add-ins (new sets of capabilities) as a way to expand what its products can do; the Data Mining Add-in allows the Excel program running on your local computer to serve as a data-mining resource for SQL Server Analysis Services. You can run SSAS Data Mining algorithms using data that resides in Excel cells to yield important information about your business.

Microsoft Office Visio

The general idea behind Visio is to create flow charts — and to publish these documents to the Web as interactive diagrams with *drill-down* capabilities (users can click their way down to specific data). Microsoft offers a Data Mining Add-In for Visio that allows users to create interactive documents with real inlaid data. For example, a decision tree can be published to the Web with actual business data built in. When users go to the Web site containing that document, they can click a decision to view its results. (For more about Visio and its Data Mining Add-in, see Chapter 7.)

Microsoft SharePoint

One of the most talked-about Microsoft products as of late is definitely SharePoint. Modern businesspeople need to communicate constantly and maintain a tight connection to their products, markets, and business processes. SharePoint fulfills this need — so it's increasingly popular as a way to deliver Microsoft BI data. Some of the main features of SharePoint — Excel Services, PerformancePoint Services, and a tight integration with SQL Server Reporting Services — are well suited to the task. To see why, read on.

Excel Services

Excel Services addresses two primary problems that arise among organizations that use Excel extensively:

- ✓ When individual members of an organization become adept at using Excel, they often come up with custom spreadsheets that perform specific tasks very well but can be difficult for others to use. A customized spreadsheet can become so unwieldy that nobody (often even the original creator) understands how it works or how to update it.
- ✓ One original file can spawn hundreds of mutations as it's passed from person to person, e-mailed around, and modified slightly in between. Eventually no one can be sure which version of the Excel document is the “correct” one, and which versions have been changed, updated, or even tampered with.

SharePoint Excel Services addresses both problems by allowing an Excel document to be posted to a SharePoint Web site. Only one version of that Excel document can be viewed by users who have access to the SharePoint Web site. You can maintain security on the document by limiting how many users can update the original, and by limiting which users can view it. The actual Excel document appears as embedded in the SharePoint Web site. The entire, actual Excel document (or just a summary or graph from within the document), can form one piece of a larger BI picture that resides on the company's SharePoint Web site.



The concept of pulling many pieces of key data into a single view on a SharePoint Web site is called *dashboarding*. On a car dashboard, you have all the critical information about the car (speed, RPM, remaining gasoline, and oil pressure) right in front of you. Similarly, a BI dashboard provides all your critical business information in one easy-to-view location: a dashboard Web site.

PerformancePoint Services

PerformancePoint Services for SharePoint provides *scorecarding* (that is, a quick chart or scorecard that reports on progress toward goals) as well as dashboarding (that is, a report showing the status of a number of key metrics).

Reporting Services Integration

The Reporting Services component of SQL Server is a very powerful BI component: It not only creates reports, using many different data sources, but also stores those reports in its own application: Report Manager. Report Manager is a very powerful system for storing and managing reports but in the end it is yet another system for managing a particular type of content, a report.

One of the reasons SharePoint has moved to the center of the organization is that it can manage many different types of content including reports. SQL Server Reporting Services (SSRS) is tightly integrated with SharePoint. In fact, SSRS offers an Integrated Mode that puts the SharePoint server in control of managing all BI reports. As a result, reporting simply becomes another type of content contained within the SharePoint system and sits right along side other documents such as PDF, Word, and Excel as well as many others. The power of an Enterprise Content Management (ECM) system such as SharePoint provides the following benefits for storing reports:

- ✓ Users have to check the reports in and out.
- ✓ Document versions are controlled.
- ✓ Security is integrated into each document.
- ✓ Reports are embedded directly in SharePoint Web sites.

Microsoft BI Development Tools

Microsoft offers two general tools for developing and customizing its products' BI capabilities:



- ✓ **Visual Studio** gives the hard-core technical person or super-power-user a way to enhance BI processes and shape them to the needs of a specific business.
SQL Server includes a free version of Visual Studio that's designed especially for Microsoft BI: Business Intelligence Developer Studio (BIDS).
- ✓ **Report Builder** is designed for end users and business analysts; it provides the advantage of uniform reports that work well with Microsoft BI capabilities, regardless of organizational department.

In addition to Visual Studio and Report Builder, Microsoft has a couple of programming languages that are used in BI development. Silverlight is a technology that provides a rich experience through the Web browser, and Microsoft .NET ("dot-NET") is a framework and programming language designed to run on Microsoft operating systems.

Table 1-3 lists and describes these tools.

Table 1-3 Tools to Develop and Customize Microsoft BI

<i>Product</i>	<i>Description</i>
Visual Studio	A program for desktop computers, known as an Integrated Development Environment (IDE) and used primarily by developers and database administrators.
Report Builder	Report Builder is an end-user application that creates uniform reports. Like Office 2007 and later, Report Builder uses a Ribbon at the top of the user interface for navigation and access to commands.
Silverlight	<p>This technology extends the functionality of a Web browser without requiring it to reload a Web page with every interaction. You have probably browsed to a page to search for a product or book travel. Whenever you click a button the page refreshes and flashes and loads again. Silverlight provides developers the ability to build Web sites that, once loaded in the browser, operate in a smooth fashion just like an application running on your local computer. The nice thing about Silverlight is that it is supported by multiple Web browsers.</p> <p>Since Silverlight is a programming language its applications are almost limitless. Any scenario where you would need rich interaction through the Web browser is where you would use Silverlight. For example, if you were building an information system about your manufacturing equipment, you could use Silverlight in order to provide features such as the ability to click on a particular machine part and have the window magically transition into the detailed specifications without the need to flash, reload, and redisplay a new page.</p>
Microsoft .NET	The Microsoft .NET technology is a programming framework used by developers to build applications on the Microsoft Windows platform.

Visual Studio

Many Microsoft developers probably spend most of their working time in the Visual Studio program. Visual Studio has all the tools they need for creating Microsoft-friendly custom solutions in one place. Visual Studio provides project templates for developing nearly all aspects of a BI solution.



Microsoft has released a version of Visual Studio that includes only its BI components and which installs with the SQL Server product. This allows for BI development without needing the full featured Visual Studio product. When SQL Server installs it looks to see if Visual Studio is already installed on the computer. If it is installed, then it adds the BI functionality to this already installed program. If Visual Studio is not installed, then it installs the BI only version of Visual Studio called BIDS. BIDS stands for Business Intelligence Developer Studio, but in fact it is just Visual Studio with only the BI development components.

Report Builder

You can imagine, and may have already experienced, how unproductive it can be when business users have to go through the IT team in order to analyze data and build reports. Business users feel that IT doesn't understand what they are trying to say, and IT feels that business users just don't get technology. Both sides are probably correct, but that doesn't help get the right information in the reports and the reports to the right people at the right time. Microsoft has developed a desktop tool called Report Builder to avoid this unproductive process that is as easy to use as Microsoft Word or Outlook. (Check out Chapter 8 for more about Report Builder.)

Silverlight

You may spend much of your time in a Web browser working with various applications. In fact, if you work with SharePoint, then you probably access it through your Microsoft Internet Explorer Web browser. Whenever you open Internet Explorer and work with an application, you are actually using your desktop computer *and* Internet Explorer as a client to a program that runs on a server.

The server computer may be sitting in your company data center or out on the Internet somewhere, depending on the Web application. Each interaction, whether it's clicking a link or selecting a drop-down menu, sends a communication back to the server. Silverlight, a browser add-on, attempts to reduce much of that back-and-forth communication between client and server by allowing the local computer to run the program without constantly talking to the server computer. Silverlight gives your Web browser added functionality that makes browsing a Web site a much richer experience.

Microsoft .NET

When Web aficionados hear the term “.NET” (pronounced “dot net”), their first thought is almost always “domain name” extensions tacked on to the names of Web sites to identify Internet domains — .com, .net, or some other domain such as .org. The guess is understandable but wrong. Microsoft .NET is actually a software-development tool; it has nothing to do with the domain names you type into your Web browser.

In a nutshell, Microsoft .NET provides a framework within which software developers can create and customize programs to work well with Microsoft products — using various programming languages. It’s handy for developing the BI capabilities of those products. Chapter 11 covers .NET in greater detail.

