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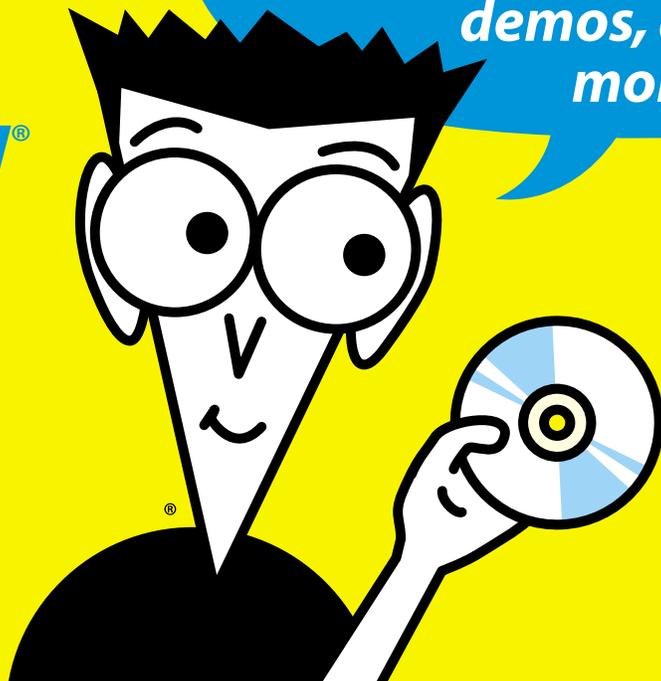
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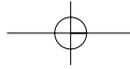
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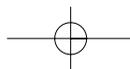
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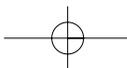
**by Dan Woods
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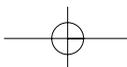
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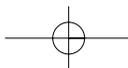
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About the Authors

Dan Woods has a background in technology and journalism and now runs the Evolved Media Network, a firm focused on technology communications. He was CTO of TheStreet.com, and CapitalThinking, led development at Time Inc. Pathfinder, and created applications for NandO.net, one of the first newspaper Web sites. Dan has an M.S. from Columbia University's Graduate School of Journalism and a B.A. in Computer Science from the University of Michigan. He covered banking for three years at *The Record* of Hackensack, was database editor for three years at the *Raleigh News & Observer*, and has written six books on technology topics, in addition to numerous white papers and magazine articles. He thanks his wife, Daniele Gerard, and his children, Fiona and Eamon, for their indulgence and support during this project.

Jeffrey Word is the Director of Technology Strategy for SAP, based in Palo Alto, California. Jeffrey has worked at SAP since 2000 in a variety of roles in business development, strategic consulting, and market strategy. Jeffrey previously worked for several IT hardware and software companies in the U.S., Europe, and Latin America. He earned an MBA in International Business from Thunderbird, the American Graduate School of International Management. He also earned a B.A. in European Studies and Spanish from the University of Oklahoma.

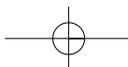
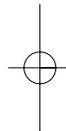
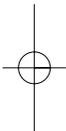


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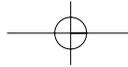
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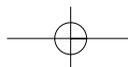
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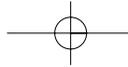
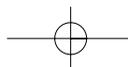


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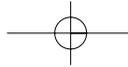
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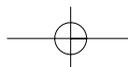
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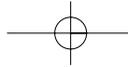
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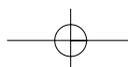
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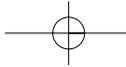
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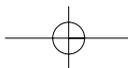
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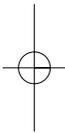


Chapter 3

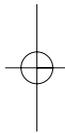
Meet SAP NetWeaver

In This Chapter

- ▶ Eyeing SAP® NetWeaver™ from top to bottom
 - ▶ Understanding the various parts of SAP NetWeaver
 - ▶ Exploring each SAP NetWeaver component
 - ▶ Examining each SAP NetWeaver tool
 - ▶ Connecting SAP NetWeaver with business process evolution
-



In an orchestra, each instrument has a different job. The composer or arranger assigns parts to flutes, tympanis, and trumpets, and each instrument has a special role. The rhythm generally stays with the percussion crowd. The violins and French horns may carry the melody along. But during the concert, all instruments add to the harmony of the piece.

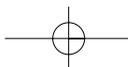


The various components of SAP NetWeaver work the same way. Each is a powerful instrument that can make many different kinds of IT music, but each also has one thing that it does particularly well. Each uniquely talented component has the most value when playing well with others to solve a problem.

In this chapter you look at each component from the perspective of how it meets the goals of SAP NetWeaver, what sort of integration it provides (people, information, or process), where it fits on the application stack, and how it relates to other components.

We also look at where SAP NetWeaver is going as a product. SAP NetWeaver first arrived on the scene as a set of components which we describe here. In the future all these component tunes will come together in one unified work. In other words, in 2004 SAP NetWeaver will become less like a collection of components and more like a platform.

This goal of this chapter is to show you enough about all of these IT instruments that you can become a regular Mozart of business data.



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Giving SAP NetWeaver the Once-Over

In this chapter we fill your brain with visions of millions of lines of code and hundreds of person-years of work. How do we achieve this amazing feat? Well, this is a book about an SAP product, and SAP is all about processes, so here is the way it works — we show you each component of SAP NetWeaver related to four characteristics of the product:

- ✓ **Goals:** How the component helps achieve SAP NetWeaver goals of increasing usability, supporting integration, enabling innovation, and saving money.
- ✓ **Integration:** How the component helps integrate people, information, and processes.
- ✓ **The application stack:** What areas of the application stack the component primarily inhabits, as shown in Figure 3-1.
- ✓ **The big picture:** How this component is designed to work with other SAP NetWeaver components.

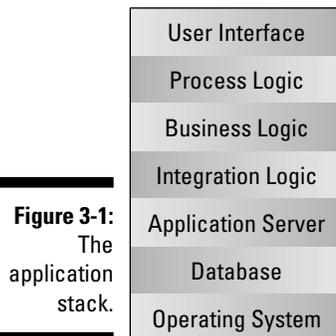


Figure 3-1:
The
application
stack.

We'll also take a look at *identity* — that is, how the new version, SAP NetWeaver '04, will change the way the product is defined and packaged for the IT community.

Along the way, we also briefly explain the larger domain of the world of IT and its relationship to each component.



The References section of the CD-ROM included with this book contains detailed, real-life customer examples. You'll find examples for all the products discussed in this chapter: SAP® Enterprise Portal, SAP® Mobile Infrastructure, SAP® Business Intelligence, SAP® Master Data Management, SAP® Exchange Infrastructure, and SAP® Web Application Server.

In this chapter you take a tour of almost all the different kinds of functionality that the IT world has to offer. Get ready, get set . . . go!

The Fast-Moving Parts of SAP NetWeaver

This chapter gives you a bit of a different take on SAP NetWeaver, focusing on the products that it consists of, rather than its capabilities.

Why? Well, because the most common way to think about SAP NetWeaver is to think of its capabilities for people, information, and process integration, as shown in Figure 3-2.

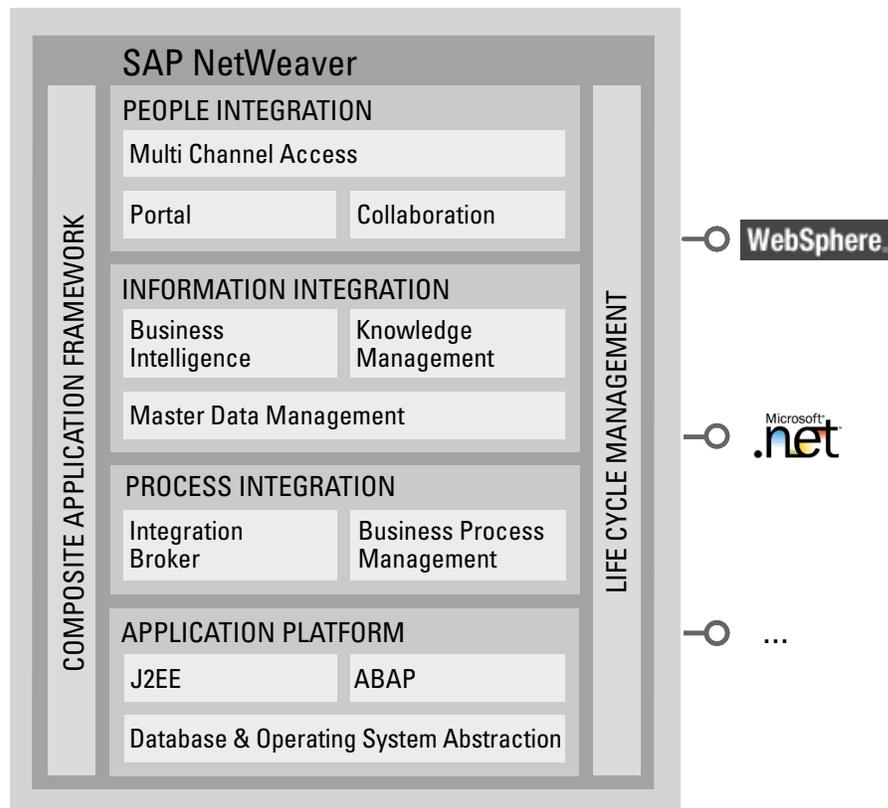


Figure 3-2:
SAP
NetWeaver
capabilities.

Imminent integration

Looking at SAP NetWeaver this way is a component-oriented sort of mindset. So is categorizing the capabilities in terms of people, information, and process integration. This is a view of the parts, not of the whole. As we

explain shortly, the SAP NetWeaver '04 view of SAP NetWeaver is much more about the benefits of the integrated platform. This will be covered in the final section of this chapter, "What Can SAP NetWeaver Do for You?"

But frankly, you can't feed a population on ideals, and you can't build a system with a collection of capabilities, which are a description of the kind of work that is done. You need software products and toolkits that you can grab onto and use to do the work and build a new world (or at least a new solution for your business).

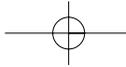
In this chapter, you get a tour of all the SAP NetWeaver components. Even though all these components will eventually grow together, we start with a component perspective because an understanding of the parts provides the basis for an understanding of the integrated platform. To pander to the left side of your brain, we organize the components into two different categories: integration tools and development tools.

Integration components are software products that help perform the work of enterprise applications by providing a powerful engine or platform for a specialized type of functionality. In SAP NetWeaver you'll find the following integration components:

- ✓ SAP Enterprise Portal
- ✓ SAP Mobile Infrastructure
- ✓ SAP Business Intelligence
- ✓ SAP Master Data Management
- ✓ SAP Exchange Infrastructure
- ✓ SAP Web Application Server

Development and management tools help create and operate software. In SAP NetWeaver these are the development and management tools:

- ✓ SAP NetWeaver Developer Studio
- ✓ SAP Visual Composer
- ✓ SAP Composite Application Framework
- ✓ SAP Solution Manager



Each of these tools is a world unto itself, so we'll review these components one by one.

It's about a central access point: SAP Enterprise Portal

Applications are frequently organized around a function, such as accounting or purchasing. Some tasks that involve several functions force users to jump from application to application to get their jobs done.

Now, it's human nature to quickly get weary of Madonna music videos and of moving from screen to screen in applications that look and work differently. This wastes a lot of time and requires really boring training for each of the different systems. SAP Enterprise Portal (SAP EP) is a set of technologies for creating role-based user interfaces that solve this problem. SAP EP shows you exactly what you need to do your job and makes it easier for you to work with business applications by bringing functions from many applications together into one place.

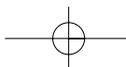


Like the arrival/departure screen at an airport, portals are also a central access point, the one place people go for important information. By harmonizing the look and feel of different types of applications from different vendors, you make your users much more productive, and, along the way, you save tons of money.

SAP EP starts by providing one place where you can access all those different programs, but SAP EP can do fancier integrations. When that happens, all of the information and applications underneath them are hidden, and the user interface looks like one unified program that was built just for you, like My Yahoo! or My MSN, only better. SAP EP even allows you to tweak that interface so that you can decide exactly what you want to display, and you can hide things that are totally unimportant.

SAP EP also adds some features that are not available in other applications. For example, SAP EP provides workflow features that help you keep track of which step you are at in a process. SAP EP supports collaboration among large groups of people by providing shared folders, discussion forums, and e-mail lists.

The most important parts of SAP EP are the knowledge- and content-management features. These allow you to store, categorize, and search through *unstructured documents*, meaning word-processing files, presentations, spreadsheets, and all the other documents you shuffle around on a daily basis.



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SAP EP is really about integrating applications from the users' point of view, at all levels, and in the process bringing many useful things into one organized place.



How SAP EP helps meet SAP NetWeaver goals

SAP EP helps make applications more usable by creating role-based interfaces that are all about what the user needs to see to do her job. Therefore, SAP EP helps save money by making workers more efficient, because there's no more wasted time (and forgotten passwords) jumping from application to application looking for information.

But SAP EP doesn't stop there. SAP EP's collaboration functionality helps with people integration. The knowledge-management capabilities and ability to bring information from many different applications into one place are an example of information integration. SAP EP also provides a little bit of help for process integration with its workflow capability.

Some SAP EP examples

Employee self service is one of the most popular ways to use SAP EP. In this sort of deployment, all of the services that a company offers its employees, from making human resources information about health care and pension plans available, to simple modifications like changing an address, all happen in one place. This can save lots of money by reducing the burden on the HR staff, who otherwise have to answer all of these questions one at a time.

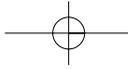
Another popular self-service use is an external portal in which a company enables all of its suppliers to keep track of shipments, invoices, and payments through a Web site, which saves the Receiving and Accounts Payable departments a lot of time, paperwork, and headaches.

How SAP EP works

SAP EP works by providing a page layout template that cuts a page into a bunch of different areas. Each area can be filled with HTML or with special programs called *iViews*. (In case you schmooze with different vendor types, other companies call these sorts of programs *portlets*.) *iViews* talk back and forth with other applications or information sources and then present the information to the user. *iViews* can also send messages to each other, so that a change in one *iView* can cause other *iViews* to change.

It's sometimes easier to think of SAP EP as a facelift for older applications. It really just displays existing functionality or information in a Web-friendly way, and then allows you to perform a whole new set of activities with the same old systems.

As you can tell from this explanation, SAP EP is mostly about the user-interface layer of the stack, though SAP EP also provides some services in the integration and process logic layer.



Does SAP EP play nicely with other SAP NetWeaver components?

Here's the good news: SAP EP is designed to work with all SAP NetWeaver components. iViews can call out to each and every one of the SAP NetWeaver components to invoke their services. The bad news? Well . . . hmmm . . . there isn't any.

In fact, SAP EP has been designated as the user-interface layer of the future for all SAP products. As time passes, every one of SAP's applications will use SAP EP to build its user interfaces.

The SAP EP, like all other SAP NetWeaver components, runs on the SAP Web Application Server (SAP Web AS).

SAP Mobile Infrastructure helps mobile devices talk

Every type of different mobile device out there, such as a cell phone, pager, or PDA, has a different user interface. If you want your employee self-service portal or some other application to talk to these mobile devices, you have to write a special interface for each one. SAP thinks that's crazy, and so they invented SAP Mobile Infrastructure (SAP MI), which is like a universal translator for mobile devices. With SAP MI, you can write one interface that can talk to any device, now or in the future.

Here's how it works. First you use the tools that SAP MI provides to describe a user interface. Then, when a remote device connects to your SAP MI interface, SAP MI runtime recognizes the type of device and sends the right commands to allow that device to work with your application. Simple, huh?

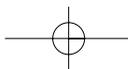
Taking integration a few steps further

SAP MI makes things easier on developers because they only have to write one interface to support many different devices. (We all want to make life easier for developers, right?) Such mobile interfaces bring applications out to people wherever they are, especially if they can't be chained to a desk and do their jobs (like folks who work on the shop floor or sell stuff on the road).

SAP MI helps with SAP's goals of people and information integration by making business applications and crucial information more accessible. It can also help with process integration by reducing delays in distributing information.

How do you use SAP MI?

So, you want some examples? How about this: Use SAP MI to extend project management information to people, wherever they are, to reduce delays and



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bottlenecks. Or provide your sales force with access to the Customer Relationship Management (CRM) system through mobile devices, another classic application of SAP MI.

Just how does SAP MI work?

SAP MI applications are built in the SAP NetWeaver Developer Studio and they run on the SAP Web AS and on a mobile device. SAP MI resides in the user-interface layer of the application stack. A user interface is designed using a set of predefined elements, such as text boxes, buttons, and so forth. The relationships between these elements are specified or *modeled*, meaning that the relationships between the elements are defined by the developer using a graphical tool, and kept track of using what is called *metadata*. The metadata description is then used to generate code for the various mobile devices that are supported. This modeling approach is used all over the place in SAP NetWeaver because it is so much more efficient for developers and makes changing the code so much easier.

SAP MI and all the other SAP NetWeaver components

Certain components of SAP NetWeaver tend to have relationships with others — isn't that sweet? SAP MI primarily has a special bond with the SAP NetWeaver EP. Usually an SAP MI interface is a special version of an already existing interface in SAP EP.

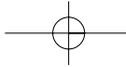
But that does not have to be the case. SAP MI is a flexible enough environment that any application, not just portals, can use it to connect to all sorts of devices.

SAP Business Intelligence: There is intelligent life out there

Perhaps after a lengthy meeting where exactly zilch gets accomplished, you doubt that business and intelligence go hand in hand, but SAP is out to prove you wrong. SAP Business Intelligence (SAP BI) brings together information, helps analyze and make sense of it, and then distributes both the information and its findings to whoever needs them.



SAP BI falls into a category of products called *data warehouses*. The basic functions of SAP BI are like most data warehouses. For example, imagine that a company has 20 different divisions, managed by five different CRM systems. All of the forecasting data might be consolidated in a data warehouse. This happens first through a process known as *extraction, transformation, and loading*, in which the information is basically copied into the data warehouse and put in a normalized form. (A *normalized form* involves pouring all the records from all the different CRM systems into one standard format.) The



data is then rolled up into summary information, and precalculated structures called InfoCubes are created that allow complex questions to be answered rapidly.



The process of looking for interesting nuggets of information in data warehouses is called *data mining*. Fancy models are created and used for analysis or to alert the company to different sorts of events that the data may reveal, such as falling sales in a particular region.

But SAP's vision goes far beyond what is typically included in a data warehouse because it is so well integrated with other mySAP™ Business Suite solutions and other SAP NetWeaver components.

For example, SAP BI goes light years beyond the standard reporting that you might be accustomed to (you know, the stack of incomprehensible green and white dot-matrix reports stacked under your desk gathering dust). The trick is to do all the rocket science in the guts of SAP BI and display the relevant results in simple, easy-to-read graphics that anyone can understand and use. After all, analytical tools are pretty much worthless if you have to have a Ph.D. in advanced mathematics to use them.

One of the major uses of SAP BI is for performance and operational measurement. Because of the power and flexibility of the data warehouse and modeling tools, you can finally compare many different parts of your business as apples to apples.

SAP BI has many other capabilities. Information can be distributed out to smaller collections of data called *data marts*. Advanced tools for creating reports and queries from SAP BI allow you to easily import that data into other SAP applications and SAP NetWeaver components. Special packages of what SAP calls *business content* allow SAP BI to reach into applications such as CRM and perform complex analysis, all without having to build everything from scratch.

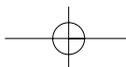
Meeting SAP NetWeaver goals

At this point, you should know you're in the presence of royalty, because SAP BI is the king of information integration. It's a flexible repository that can create a unified and normalized view of information from any number of sources. You can store vast quantities of data in SAP BI, which can then be analyzed and the results delivered wherever you need them.

SAP BI helps improve usability by providing one consistent view of information, rather than requiring users to jump around in many different systems and dig around for the data they need.

How you use SAP BI

A classic example of SAP BI application is where you use SAP BI to consolidate sales data from many different divisions into one consistent format so it



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can be analyzed with advanced tools. You might examine buying trends across geographic or demographic groups. For example, a huge soft drink vendor might want to know everything that a fast-food chain buys from them around the globe on a weekly basis in order to minimize shipping costs. Or an athletic shoe manufacturer might want to analyze daily sales of a certain sneaker, broken down by retail outlet and by ZIP code, and then combine that information with advertising data to see what ads are most effective.

The ability of SAP BI to collect information and provide an audit trail of its origin and how it was transformed make it the perfect tool for compliance with new laws such as Sarbanes-Oxley, which mandate stringent and auditable reporting on corporate performance.

How SAP BI works

So what does SAP BI do to work its magic on your data? It's actually no mystery. SAP BI first creates a copy of all of the data in the repository. Then, using rules for transformation and various modeling techniques, the information is brought together and cleaned up into nice, neat information objects. These are then combined into InfoCubes to support what is known as *Online Analytic Processing (OLAP)*. OLAP is kind of a super query-handling machine (that can deal with more complex queries than everyday database systems) based on precalculation of partial results in InfoCubes. OLAP also lets you take a look at data based on several criteria at once. Trust us, it's cool.

Okay, back to SAP BI. SAP BI has a distribution mechanism called *Open Hub Services*, which distributes portions of data out to those smaller collections of data, the data marts. SAP BI offers lots of query- and report-generation tools that you use to produce very nice looking, useful reports.

In case you wonder where SAP BI lives, it operates at the database layer of the application stack, with a large number of functions for reporting and analysis in the user-interface and application layers.

How does SAP BI work with other SAP NetWeaver components?

SAP BI, unlike all the other SAP NetWeaver components, is powered by solar energy. Well actually no, it runs on the SAP Web AS, just like every other component.

Here's a rundown of its relationships with other SAP NetWeaver family members:

- ✓ SAP BI is tightly integrated with SAP EP.
- ✓ SAP BI can generate various types of queries and reports and save them directly as iViews, which can be included in the portal.
- ✓ The results of SAP BI Web applications can be stored in the content-management repository.

- ✓ SAP BI applications can be included in collaborative elements like chat rooms and discussion forums and also distributed to mobile devices through SAP MI.

Building harmonies from information with SAP Master Data Management



SAP Master Data Management (SAP MDM) is a system for harmonizing information that is distributed across a wide variety of applications. In a way, it is a toolkit for building real-time, read/write data warehouses for what SAP calls master data. *Master data* is data that is not connected to any one particular transaction, such as customer information, product descriptions, and charts of accounts.

In a data warehouse, all of the information is copied into a central repository and SAP MDM enables this mode of operation, which it calls *content consolidation*. But it also allows other modes such as *data harmonization*, in which the data in all the distributed repositories are made consistent. Under data harmonization, for example, the old and new addresses of a particular customer might be made consistent in all systems.

Essentially, *centralized master data management* is a scenario in which the master data no longer resides in the distributed applications, but instead, you access it from one central repository.

Furthering SAP NetWeaver goals

Integrity in people is a really important thing, and it's no less important in your data. SAP MDM is all about information integration in real time to ensure data integrity. While data warehouses are primarily about reporting, getting master data into a consistent format can help greatly with application and process integration. Reducing data errors and inconsistent data can mean huge savings because you prevent errors. Consistent data means that integration and maintenance costs also drop.

Some SAP MDM examples



Companies that have many different purchasing systems often end up with identical parts from the same supplier. The tricky part is that these things may be called something different in every system. Because the different divisions don't know that they're buying the same thing, they don't get a volume discount from the supplier. SAP MDM can harmonize all the different part numbers so that the company can get the real picture of what it's buying, how much it's paying, and who it's buying from. Knowledge is power (or, in this case, savings).

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How SAP MDM works

SAP MDM lives in the database and integration logic layers of the application stack. It uses the *metadata* (that is, data that describes the structure and location of data in each distributed repository) management and storage capabilities of SAP BI and the messaging, data mapping, and business-process management capabilities of SAP Exchange Infrastructure to transport and transform the data. A variety of special-purpose tools allow you to configure SAP MDM to automatically find duplicates or transfer information about relationships discovered between records to other programs.

SAP MDM gets along with other SAP NetWeaver components

Stop us if you are tired of hearing this, but SAP MDM, like all SAP NetWeaver components, runs on the SAP Web AS.

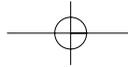
SAP MDM relies on SAP BI and SAP Exchange Infrastructure to do its job. It can provide master data to any SAP NetWeaver component.

All aboard SAP Exchange Infrastructure

SAP NetWeaver Exchange Infrastructure (SAP XI) is like a railroad system for data and messages traveling between applications. When two applications need to communicate, SAP XI provides a framework to build adapters to each application, sort of like railroad tracks that switch from one data format to another and route the flow of messages. Using all of these features, messages can flow back and forth with high levels of security and guaranteed delivery. Plus, by using a messaging hub like SAP XI, you don't have to rewrite every interface each time you make a change to one system or the other. You just change one interface to SAP XI and save loads of time and money.

You can send messages back and forth on this high tech railway line to synchronize databases, integrate processes, remotely call functionality, and perform business-to-business integrations, all asynchronously or in real time.

As if that weren't enough, SAP XI also has advanced business-process management capabilities. This allows your systems to monitor complex series of events and react to them automatically, which is the key to success in many different integration scenarios. How would it work? Well, for instance, the SAP XI business-process management capabilities could help a supply chain management system schedule a product for manufacturing only when all of the parts have been received from suppliers. SAP XI can wait and monitor messages over days, weeks, or months, and then initiate the right automated response.



First stop: Meeting SAP NetWeaver goals

SAP XI is a powerful engine for application-to-application (A2A) integration and process integration. It is a flexible modeling toolkit for replacing custom coding with configuration and code generation, which, believe us, can save you big time on development and maintenance costs.

Also, by managing the integration of applications and business processes at one time, with the same tool, you can actually connect technology with a business need and tell the systems when to talk to each other, what to say, and how to say it, according to which step of the business process you're in.

How you use SAP XI

Say you have to exchange sales orders between a purchasing and a sales-management system. You have to pass around order acknowledgements and change orders and many other documents between these systems in a common format so that the system can read them electronically. SAP XI does all that, and in the process it eliminates the need for redundant manual entry of data.

SAP XI works this way

SAP XI sets up housekeeping in the integration and process logic layer of the application stack. This whiz kid has an integration repository that is used to store descriptions of messages, an integration directory that helps the system find message types and mappings, and an integration server that sends and transforms XML messages. The integration server has engines that make adapters, business process management, and data mappings work. Oh, and one added bonus: SAP XI also allows you to use Web services to send and receive messages.

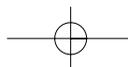
Traveling along with other SAP NetWeaver components

SAP XI functionality is like the universal slicer and dicer of SAP NetWeaver, because it can be used by almost every SAP NetWeaver component. Portals can use information from SAP XI messages, SAP Web AS can use Web services fuelled by SAP XI or process the messages directly. SAP BI and SAP MDM use SAP XI to move information back and forth from distributed repositories.

SAP XI runs on the original version of Microsoft Basic. Okay, there's no fooling you: Like all SAP NetWeaver components, SAP XI runs on SAP Web AS.

SAP Web Application Server

SAP Web AS is the foundation on which SAP NetWeaver is built. It's like the engine behind the scenes of SAP NetWeaver that drives all of SAP's applications and tools. The mySAP Business Suite solutions are written in ABAP and



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run on top of SAP Web AS. SAP EP is Java code that runs on top of SAP Web AS. SAP Web AS is as essential to the well being of SAP NetWeaver as coffee is to jump-starting corporate America every day.

SAP Web AS is as tightly connected to the SAP NetWeaver development environment as the IRS is to your income. That's because it is such a core part of building applications and tools. It's also the way that customers create custom code for their own applications.

It can be tricky to understand SAP Web AS because many of the development components operate at both development time and runtime. Keeping the distinction in mind between the development time and runtime capabilities of SAP Web AS can help.

At development time, all of the work to create applications is done through SAP NetWeaver Developer Studio, which we explain in the next section on tools. The code is then executed at runtime on SAP Web AS.

The following are important points to understand about SAP Web AS and its capabilities:

- ✓ **SAP Web AS supports two languages at the same time.** Kind of like a UN translator, SAP Web AS supports Java code that meets the J2EE 1.3 specification and ABAP code, which is SAP's language for business applications.
- ✓ **SAP Web AS is a fully developed application server, comparable to IBM's WebSphere or BEA's WebLogic.** SAP Web AS has capabilities for load balancing, communicating with the Internet, connecting with databases, building Web pages, and creating Web services.
- ✓ **SAP Web AS supports the SAP Web Dynpro environment for creating user interfaces through modeling and code generation.**

How SAP Web AS meets SAP NetWeaver goals



SAP Web AS gives you two big perks for the price of one. First, you get more value out of the ABAP applications (SAP R/3[®], mySAP Business Suite) you have in place; second, you can now easily extend the functionality of those and other systems by using a much more common language: Java. By combining ABAP and Java, SAP Web AS gives you this great single environment in which to work with applications, regardless of what language they were written in. This saves a whole lot of time, money, and effort for developers — just ask one.

SAP Web AS is directly involved in all three types of integration: people, information, and process. Web services created on SAP Web AS can bring a legacy application into the portal, provide information to a data warehouse, or help SAP XI communicate between applications.

How SAP Web AS is used

SAP Web AS does everything from running mySAP CRM to executing custom Java and ABAP code. But keep in mind that the typical use of SAP Web AS is invisible to the user.

Getting under the hood

In this section, you noodle around in SAP Web AS to see what makes it tick. SAP Web AS is involved with all levels of the application stack, and it has the following groups of components:

- ✓ The Internet Communication Manager, which talks back and forth with the Internet.
- ✓ Runtime engines for Web Dynpro, Java, and ABAP to execute code written for those platforms.
- ✓ Web Services Infrastructure, which has all the plumbing to support deployment of Web services.
- ✓ The Open SQL database abstraction, which ensures that any relational database can sit underneath SAP Web AS.

SAP is a member of the Java Community Process and is a leading definer and implementer of all Java standards. What does that mean for you? Well, as a result, SAP Web AS is one of the most open and standards-friendly platforms.

Development for SAP Web AS is aided by the Java Development Infrastructure, a suite of tools for development that is explained in detail in the later section, “SAP NetWeaver Developer Studio’s toolkit.”

How SAP Web AS works with other SAP NetWeaver components

SAP Web AS is the foundation of SAP NetWeaver components and mySAP Business Suite solutions and is involved in helping all of them do their jobs.

Development Tools: The SAP NetWeaver Construction Set

So, you’re probably thinking, this stuff all sounds great; how can I get some? With these tools you can build applications that leverage all the components. In fact, SAP has a full suite of development tools you use for different purposes:

- ✓ **An integrated development environment for Java coding:** When you really want to get under the hood and tinker, SAP NetWeaver Developer Studio provides an integrated development environment for Java coding,

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with many different extensions for those times when you want to do weird and wonderful stuff.

- ✓ **SAP Composite Application Framework:** A model-driven development environment for creating composite applications, which use services provided by existing applications as the foundation for building new applications.
- ✓ **SAP NetWeaver Visual Composer:** This tool provides the user-interface modeling environment for the SAP Composite Application Framework (quite a mouthful, but trust us, this is the easy one).
- ✓ **The solution manager:** This central service platform uses a combination of software and services to help move a program through its life cycle and keep it updated and running smoothly through all phases: from installation, through testing, deployment, monitoring, management, and finally into a comfortable retirement.

Of course, people often say it can't be that simple, and indeed, it isn't. But after you discover what these tools can do, we think you'll be amazed at their potential.

SAP NetWeaver Developer Studio's toolkit

As far as development tools go, all roads lead to the SAP Developer Studio.

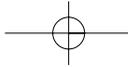
SAP NetWeaver Developer Studio is based on Eclipse (www.eclipse.org), which is a super toolkit for building development tools. (Programmers love building toolkits.) IBM came up with the Eclipse framework and decided in a generous moment to share it with the rest of the world. So now others, SAP included, use it to create development environments of their own.

The SAP NetWeaver Developer Studio has an environment for building programs in the ubiquitous Java language, with all its support for editing, managing source code, and building and debugging programs that developers have come to know and love. Special features for development of Web services are also provided.

There's more good news: As time goes by, the SAP NetWeaver Developer Studio will become even more of a modeling environment and other languages besides Java will be supported.

Breaking new ground

The SAP NetWeaver Developer Studio is used by all sorts of SAP developers. In fact, Developer Studio is essential to those creating SAP products, as well as systems integrators and developers creating their own applications.



The SAP NetWeaver Developer Studio has been pushed to the outer limits as a development environment through a set of capabilities called the Java Development Infrastructure (JDI). The JDI supports features such as a Java Dictionary of data types and definitions, tracking of dependencies between modules, and automatic rebuilding of libraries, which are features that SAP has found critical to making users productive over its 30-year history of developing software.

Where SAP really breaks new ground is in how you can use SAP NetWeaver Developer Studio as an application modeler. The SAP NetWeaver Developer Studio supports a user-interface framework called SAP Web Dynpro, which allows programmers to specify in a simple way, without using Java code, what a user interface should look like and how it should act. The Java code to create this user interface is then generated automatically. You can then improve and customize the generated code with additional Java code to fill in any gaps.

SAP didn't want to leave the hot wireless technology out of the loop, so SAP NetWeaver Developer Studio has a similar environment for creating user interfaces for wireless and handheld devices: the SAP MI.

SAP NetWeaver Developer Studio also includes special environments for developing portal interfaces, which are key to almost every project you tackle.

Helping SAP NetWeaver users in many ways

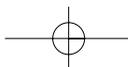
The code you write in the SAP NetWeaver Developer Studio makes the triple-play of people, information, and process integration by helping programmers be more productive. Essentially, programmers spend as much time as possible adding value and as little time as possible dealing with trivial details. In this way, the SAP NetWeaver Developer Studio supports innovation and saves your company money.

How it works with other SAP NetWeaver components

The SAP NetWeaver Developer Studio creates applications that run on SAP Web AS. Code from the SAP NetWeaver Developer Studio can exist at any layer of the application stack.

SAP Composite Application Framework

The SAP Composite Application Framework (SAP CAF) is a modeling and development environment for creating composite applications. (You probably guessed that, right?) *Composite applications* are essentially applications built out of services provided by other applications.



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Composite applications are very hot in the current IT environment because they help you accelerate development by leveraging and reusing existing applications.

SAP CAF allows you to define applications using role-based or process-based modeling. Here's how it works:

- ✓ SAP NetWeaver Visual Composer, the new UI modeling tool, helps build front ends.
- ✓ Flexible objects called *guided procedures* help move a user through a process one step at a time.
- ✓ The existing functionality of SAP NetWeaver, mySAP Business Suite solutions, and that from other vendors is accessed through an object access layer.
- ✓ Features for managing collaboration and communication are built in. A control center allows a user to see all of the roles she is playing within several composite applications and navigate the applications based on those roles.

SAP CAF has the effect of allowing almost an entire application to be modeled rather than coded by hand. This is good news, because when it comes time to change the processes or user interfaces of an application, the change happens through adjusting the model, not through the tedious task of manipulating code. This also means that you easily can modify and optimize applications to better support your business processes.

How you use SAP CAF

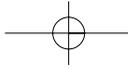
You create SAP xApps™ using SAP CAF, building these applications on top of SAP NetWeaver, mySAP Business Suite, and other non-SAP applications. SAP CAF uses their roles, guided procedures, and collaborative functions to automate cross-functional processes such as product definition and resource and program management.

What goes on inside SAP CAF

SAP CAF has a metadata repository that contains information that describes the objects, roles, and user interfaces, as well as the relationships between all of those things. This metadata is then used to generate the code that runs on the SAP Web AS. In this way, a small amount of metadata can be used to generate hundreds and thousands of lines of code. And hundreds and thousands of lines of code would warm the cockles of any developer's heart, right?

How SAP CAF works with other SAP NetWeaver components

SAP CAF is like the ringmaster of modeling. It uses all SAP NetWeaver components as services. Through the object access layer, for example, you can



make the search features of the SAP Knowledge Management component part of any object in the SAP CAF. The same holds true for collaboration features and the ability to send and receive messages using SAP XI.

SAP CAF has special features for controlling applications that allow for on the fly adjustments. Guided procedures create flexible processes that walk a user through an interface composed of services or screens from existing mySAP Business Suite solutions.

Solve your problems with SAP Solution Manager

SAP has graciously handed its customers the same tools for managing the life cycle of an application that it uses to manage its own products. For 30 years, SAP has developed, installed, configured, and upgraded software in heterogeneous, multiplatform environments. And it's no slacker in development, is it?

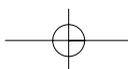
With SAP Solution Manager, you can keep track of the versions of installed code, separate local customizations from the core product, get an installation and packaging framework for components of an application, and take advantage of a systematic approach to patches and upgrades.

SAP Solution Manager also provides a framework for configuration and management of an application in a high-availability environment. This means that it provides monitoring of the mySAP Business Suite solutions, SAP NetWeaver components, and applications from other vendors. It also reaches inside applications to monitor the processes going on inside. By all of these means, Solution Manager helps improve the productivity of your operations staff and reduce maintenance costs.

How might you use SAP Solution Manager? A good example would be to manage the upgrade of any of the mySAP Business Suite solutions using the best practice process templates and automatic detection of required upgrades based on your existing software. You could also use Solution Manager to package and distribute a custom application that you're rolling out to all the data centers of your enterprise.

How SAP Solution Manager works

So, how does SAP Solution Manager manage the three-ring circus of development? It uses services from SAP support such as EarlyWatch, which gives notice of important upgrades, combined with business content about best practices for implementation and a monitoring system, along with an issue tracking and project-management framework specifically designed to support complex IT operations.



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Supporting SAP NetWeaver components

SAP Solution Manager is the installation and upgrade program for mySAP Business Suite solutions, SAP NetWeaver components, and all the applications you build using them.

What Can SAP NetWeaver Do for You?

The point of integration technologies is to help companies win in today's brutally competitive marketplace. No matter how cool all of these technologies are, if they don't help you make more money, save more money, and beat the competition, then they probably aren't worth your precious time and IT budget.

A key question you should be asking, then, is how does SAP NetWeaver help your business win? While a detailed answer to this question would differ from company to company, a basic set of principles can explain how SAP NetWeaver enables companies to build competitive advantage.

Introducing . . . SAP NetWeaver '04

Remember we told you how the component mindset of SAP NetWeaver, which presents SAP NetWeaver as a powerful set of individual instruments, is going to shift with the SAP NetWeaver '04 vision? That's when it becomes a unified platform for integration and development.

This distinction is not just marketingese: It provides many significant benefits for customers. So you can understand the brave new world of SAP NetWeaver '04, here's a breakdown of what it contains.

Synchronized release

SAP NetWeaver solutions and components are delivered here in a *synchronized* release cycle, whereby all SAP NetWeaver components are delivered in a single package. The first such release is SAP NetWeaver '04, which delivers

- ✓ SAP Web AS 6.40
- ✓ SAP EP 6.0
- ✓ SAP XI 3.0
- ✓ SAP Business Information Warehouse (BW) 3.5
- ✓ SAP MI 2.5

Remember that in addition to these components, SAP MDM, SAP NetWeaver Developer Studio, SAP Solution Manager, and SAP CAF are always integral to SAP NetWeaver.

Unified testing

The whole set of SAP NetWeaver '04 components has been tested and validated together by SAP — something that is simply not possible for *all* the potential combinations that could occur when you're dealing with random releases of different components.

One platform powering all SAP solutions

In 2004, the following SAP applications are built upon and ship with the synchronized SAP NetWeaver '04 technology base: mySAP ERP, mySAP Supply Chain Management (mySAP SCM), and mySAP Supplier Relationship Management (mySAP SRM), among others. In 2005, all SAP applications will ship on the SAP NetWeaver '05 platform.

The result? Reduced complexity. The synchronizing of, for example, SAP BW with your mySAP SCM solutions, or your mySAP CRM and portal solutions, or your mySAP SRM solutions and the SAP XI. The need for different sets of adapters and plugs-ins simply goes away and everything is handily streamlined.

It's just better for customers

Bean counters take note! There are numerous administrative, TCO, and QA benefits to this synchronized approach, including

- ✓ All of these SAP NetWeaver components are now based on the same version of SAP Web AS (Release 6.40) and so share a common technical foundation. This simplifies a wide range of infrastructure activities, including administration, monitoring, and user and security management. Everything can use the same operating system release, as well as the same DBMS release. Reduce complexity in an IT landscape and you reduce TCO.
- ✓ Many parts of SAP NetWeaver can be run within a single physical server if a small configuration is sufficient, thus reducing the number of systems and databases for you to administer.
- ✓ Many parts of SAP NetWeaver can be run within one management entity, the SAP Web AS system, with its shared database, shared central services, common external IP address, administration, and so on. An SAP Web AS system can be a single small box running just one instance of the SAP Web AS, but it can also scale up to multiple big computers with many instances of the SAP Web AS that run together as one logical (albeit huge) unit.

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Whether you're working with SAP NetWeaver today, or one of the next few versions, each shares certain key advantages for businesses that you'll read about right now.

Business Process Evolution: The better mousetrap of competitive advantage

Let's talk mousetraps for a second. Say you work at a company that is a leader in the marketplace. How did that happen? In today's hypercompetitive markets, most of the time the answer is that your company found a better way to build and sell the same old mousetrap, rather than inventing an entirely revolutionary mousetrap. Just look at Dell: It didn't invent the computer or any of its parts, it just innovated better business processes to sell computers. Dell found cheaper and better ways to build computers and get them in the hands of its customers.

In other words, your company has to develop better processes that can be executed faster and more efficiently than your competitors, leaving them in the dust. Processes such as customer service, manufacturing, procurement, and human capital management have turned out to be much more sustainable advantages over time than shorter-term advantages, such as patents for ideas that are easily copied.

Technology and data: The great equalizers

In today's world, the availability of technology and information is a great equalizer. Everyone has access to oceans of data, and technology keeps getting cheaper and better. If the secret sauce for beating the competition is better processes, the ugly truth is that the recipe for the sauce doesn't stay secret for long. Your company's competitors quickly figure out, using technology and information, how to imitate your best practices and catch up.

On top of that, business conditions change awfully fast. In this new century, boom and bust cycles have compressed. Information moves faster and markets are more and more efficient, putting the squeeze on everybody. (Just do a quick count of ulcers among high-level managers and you'll see what we mean.)

So in this environment, what is the sustainable advantage? Okay, listen closely: What you need to win is the ability to adapt processes as rapidly as business conditions change. Adaptable businesses innovate faster and beat

competitors to market. Companies that spend their time and resources innovating are more profitable, and they provide their shareholders with a greater return on equity.

You heard it here, first.

SAP NetWeaver enables business process evolution

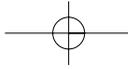
You know, it's amazing how often companies understand what they have to do to change their processes, but the rigid and costly nature of IT prevents them from making those changes. SAP NetWeaver changes this equation by breaking the IT bottleneck.

One strong theme that runs through our descriptions of all of the SAP NetWeaver components is the way that each component can be adapted to account for change. Whether it is modeling, or configuration, or just a beautifully designed product that helps manage complexity, each SAP NetWeaver component is ready to evolve as your business does. As you see in Chapter 5, SAP has a general theory of how applications should be constructed to be flexible called Enterprise Services Architecture. Enterprise Services Architecture is how SAP NetWeaver can amplify the power of the mySAP Business Suite solutions.

So what does this mean for you? Well, it kind of depends on who you are:



- ✓ **CEO:** SAP NetWeaver allows flexible implementation of business strategies so companies can adapt rapidly to changing business conditions.
- ✓ **IT professional:** SAP NetWeaver empowers IT types to drive innovation into business processes across the entire enterprise by taking an existing IT infrastructure that enables work and turning it into an enabler of change. (CEOs like things like that.) SAP NetWeaver is also built to evolve with ease, which makes change cheaper and less risky.
- ✓ **CIO:** CIOs and their fellow travelers use SAP NetWeaver as the platform of choice to better align IT with their business and support business process evolution. As we point out in the Chapter 2, TCO is made up of the cost of applications, tools, and integrating it all together. The prepackaged integration of SAP NetWeaver drives TCO as low as it can possibly go, helps reduce complexity, and still allows you to integrate with non-SAP systems.



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✓ **Developer:** For developers and architects who love gadgets, SAP NetWeaver represents the ultimate whiz bang toolkit. SAP NetWeaver is by far the most advanced platform for business computing in terms of model-driven development, business-process management, and abstraction at all levels. By becoming an expert in SAP NetWeaver, developers learn cutting-edge technology and lead change at their companies.

No matter who you are, by reading through this chapter you take quite a tour through technologies that are likely to change the future.

In the next chapter, you find out about the roots of these technologies in the past 30 years of development at SAP.

