

# **SAP R/3 Handbook, Third Edition**

José Antonio Hernandez  
Jim Keogh  
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*This book is dedicated to Anne, Sandy, Joanne, Amber-Leigh Christine, and Graff, without whose help and support this book couldn't have been written.*  
—Jim Keogh

*I would like to dedicate this book to my wife Jenelle and son Maxwell whose patience, compassion, and love afforded me the ability to participate in this creation. I love you both, you are my life.*  
—Franklin F. Martinez

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*José A. Hernandez*

*Madrid,*

*November 2005*

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# Chapter 1: SAP: From SAP R/3 to SAP NetWeaver

## Overview

This first chapter provides a broad overview of the current SAP solutions, how they have evolved, and the basics of the new architecture or technology foundations that are found in the new set of products or components of the SAP NetWeaver integration platform.

Because of the evolution of the SAP solutions, and although the third edition of this book is still called *SAP R/3 Handbook*, you must notice that most topics apply the same way to either R/3 Enterprise (mySAP ERP) or any other SAP solution that is based on the SAP Web Application Server, including several of the SAP NetWeaver components.

At the same time, and since SAP R/3 is still and will be for the coming years, and whatever the name it might have in the near future, the basic application platform for the huge SAP customer base, in this chapter and in this book in general, SAP R/3 Enterprise (release 4.7) and more specifically the SAP Web Application Server is the main topic. An organizational and technical overview of the SAP NetWeaver components is presented in [Chapter 11](#).

Right now, one of the biggest concerns of SAP customers and prospects is to understand the SAP solution sets, what business processes they are meant to solve, what benefits they provide, and, most of all, what options are available to solve or improve their business processes or business requirements.

Some of the common questions usually found in customers are as follows: What was mySAP.com? What's the buzz about SAP NetWeaver? How do I evolve my SAP systems? What are the options? How will the different solutions and components integrate?

This chapter includes an overview of the current state of the SAP solutions, focusing on the main features of SAP R/3 Enterprise release and providing background information about the evolution of the SAP solutions so that SAP solution can be better understood, It also provides useful information for the thousands of customers still running on previous R/3 releases.

## **SAP Strategic Evolution**

SAP AG started operations in 1972 and became successful in the 1980s with their SAP R/2 solution. The company name, SAP, stands for Systems, Applications and Products in Data Processing. After the introduction of SAP R/3 in 1992, SAP AG became the world's leading vendor of standard application software.

SAP R/3 was the business solution that placed SAP in its leadership position and led to the company becoming extremely successful in the 1990s. The introduction of release 3.1 of R/3 in 1996 provided the first SAP Internet-enabled solutions. In 1998 SAP transformed from a single-product company to a global business solutions company. The "first draft" of the mySAP.com strategy was introduced in 1999. The first years of the new millennium (2001–2003) were the ones in which mySAP.com was adapting and reinventing itself; the solid technological foundation was improved by the introduction of the SAP Web Application Server, which enables running programs either on an ABAP or on top of a Java engine (J2EE). During these years mySAP.com was also getting ready for the massive deployment and benefits offered by a new Web services-based architecture, which is now represented by a reality integration platform known as SAP NetWeaver.

SAP NetWeaver is defined by SAP as the Web-based integration and application platform that is used across all SAP solutions. In a general way, SAP NetWeaver is the realization of what it was meant to be with the 1999 mySAP.com strategy.

SAP history is of an evolution from a traditional, integrated, and solid ERP software company to one company that can offer a full set of business, integration, and collaboration solutions and services in the open and global business world.

### **The ERP Basics**

Enterprise Resource Planner (commonly known as ERP) software is a concept that started in the 1970s and was meant to provide computerized solutions for integrating and automating business processes across companies' back offices, such as the financial, logistics, or human resources departments. The idea behind ERP was that companies could see a cost reduction and better efficiency in the way they operated with their business partners (customers, providers, banks, authorities, etc.) and also in the way their users could access and process the information. From that concept, there were already several solutions in the market during the 1980s and beginning of the 1990s. The adoption of ERP software revolutionized the way companies conduct their traditional business.

Since the introduction of SAP R/3 in the first part of the 1990s, SAP R/3 became a clear market leader in ERP solutions.

SAP invests approximately 20 percent of its annual sales revenue in research and development in order to remain at the edge of technological innovation. With more than

25 percent of its employees working in the research area, SAP wants to make sure that it can maintain a constant dialogue with customers and users and exchange with them experiences and ideas to enhance its systems and service offerings. This information exchange is vital in order for SAP to maintain a long-term relationship with its customers and to attract new ones not just to SAP R/3 but also to the SAP NetWeaver wave.

In the mid-1990s SAP had two main products in the business software market: mainframe system R/2 and client/server R/3. Both were targeted to business application solutions and feature a great level of complexity, business and organizational experience, strength, and integration. SAP software systems can be used on different hardware platforms, offering customers flexibility, openness, and independence from specific computer technologies. Currently, the SAP offering is comprehensive and it's meant not only for the ERP back office business processes but also for the Web-enabled collaboration, integration, the full supply chain. In significant scenarios, it can also run front office processes, such as CRM, or provide vertical solutions, such as SAP for Healthcare. SAP R/3 and any of the solutions within mySAP Business Suite are all business solutions providing a high degree of integration of business processes.

For SAP a *business process* is the complete functional chain involved in business practices, whatever module, application, system, or Web Service that has to deal with it. This means, specifically for the SAP R/3 systems, that the process chain might run across different modules. SAP sometimes referred to this kind of feature as an "internal data highway." For instance, travel expenses, sales orders, inventory, materials management, and almost all types of functions have in common that most of them finally link with the finance modules. SAP understands that business practices and organization change often and quickly, so it left the systems flexible enough to adapt efficiently.

Currently, in the age of global business and collaboration, those business processes and the integration chain can run across different services, which can be provided by SAP and non-SAP solutions. The capacity of an integration platform and the concept of an Enterprise Service Architecture is what best defined the need for the SAP NetWeaver concept.

SAP R/3, which provides the core functionality for many SAP standards, mySAP Business Suite, and SAP for Industries (formerly known as SAP Industry Solutions), includes a large amount of predefined business processes across all functional modules that customers can freely select and use for their own way of doing business.

With releases 4.5, 4.6, and 4.7 (Enterprise) of R/3, SAP has incorporated a library of more than 1000 predefined business processes across all functional modules that customers can freely select and use for their own way of doing business. SAP makes new business functions available regularly.

Other main features that SAP R/3 included from the start were the internationalization of the product and integration capability.

*International applicability* was a very important part of the strategy to meet today's complex and global business needs. For SAP, this means not only having the software available in different languages but also having the capacity to cover the differentiating aspects of each country: currency, taxes, legal practices concerning human resources, import/export regulations, and so on. Users from a multinational company in different countries can work simultaneously in the same system using their own language, currency, and taxes. With Enterprise release (4.7) and SAP NetWeaver, most SAP solutions are now able to run natively in Unicode format.

An additional aspect of the software integration capability is *real time*. In fact, the *R* from R/3 originally is meant for real time. When new input is made into the system, the logical application links will concurrently update related modules so that the business can react to immediate information and changes. This type of updating reduces the overhead of manual processing and communication and enables companies to react quickly in the nonstop and complex business world, which makes SAP R/3 software and the SAP Business Intelligence solutions very valuable tools for executive planning and decision making.

ERP systems such as R/3 were often implemented as a result of a business process reengineering, which was based on analysis of current business processes and how to improve them. Many companies could improve radically their efficiency, but this change process could not (can never) stop in a global and vast marketplace where the competition is on every corner ("one click away").

From internal integrated ERP systems, companies look further to improve their supply chain and therefore to extend the reach of their processes to other partner companies. This step forward is known as interenterprise collaboration, and the goal was to integrate and make more efficient the supply chain. This concept, together with the emergence of eCommerce using the Web as the comprehensive communication platform, was key in the emergence of mySAP.com strategy in 1999.

Let's review in the [next section](#) the motivations and strategic vision of SAP to transform itself from a single-product company into a global business solutions company.

## **SAP Transformation into a Global Business Solutions Company**

The evolution of information technology systems from the beginning was quite similar in all industries and activity areas. In the 1960s and 1970s companies chose a hardware provider, and from there some basic software development products (programming languages), and started to develop their business applications. Most companies started with critical areas, like accounting and financial applications, that were somehow easier. Later, these companies advanced and introduced applications in other, more complex areas like distribution and production.

In any case, they always made their own development using the previously chosen hardware and software. Already in the 1970s there were some companies that realized the

possibility of developing business software that could be used by different companies; the opportunity existed to develop the applications only once and then sell the software to other companies. Among these companies was SAP AG, created in 1972.

Obviously the development of "standard" software was more viable in those business areas that were more "standard," like accounting and financial services. There were also more "standard" processes common to companies from the same or similar industry sectors (like manufacturing or financial industries).

At the beginning, there were many problems with this standard software and many technical obstacles that would make it difficult to sell these systems in large quantities. One of these problems was the dependency of the hardware and software platforms in which the systems were developed. At the time, it was not possible to use the same software in different hardware platforms. Another problem was that companies did not behave as standard as initially thought. For instance, payroll calculation was quite different between companies, and even more different between countries, since each country has its own laws and legal rules, agreements, contract types, and so on.

In the late 1970s and during the 1980s, these problems led to companies developing standard applications that were flexible enough to provide functional features to different types of companies and in different countries. During the 1980s, with the emergence of PCs and the massive deployment of computing and computer networks in companies, it was time to make applications independent of hardware platforms and to make those applications portable among platforms. This was the open systems wave, when different hardware vendors were designing computers that could work with (nearly) the same operating systems (UNIX flavors, Windows NT) and with the same database engines (Oracle, Informix, and others). This technological advance also enabled the development of standard applications that could be independent of hardware and software platforms.

At the beginning of the 1990s, SAP AG had a product, SAP R/2, that covered reasonably well the needs of different types of businesses in different countries and in different areas, like financial services (accounting, accounts payable and receivable, controlling, and so on), logistics (materials management, warehousing, distribution, sales, and production), and human resources (payroll, time management, personnel development). This system was installed in approximately 3000 companies around the world.

The logical and natural evolution from R/2 to an open systems environment led to the birth of R/3 in 1992. SAP R/3 was developed through SAP AG's 20 years of accumulated experience in solving the business problems of its customers, along with experience in computing and managing complex networks. The company had experience and enough technological background for R/3 to succeed.

In a few years, the growth in the number of customer installations of the R/3 system was exponential: 900 installations at the end of 1993, 2400 in 1994, 5200 at the end of 1995, 20,000 by the middle of 1999, and more than 60,000 at the end of 2004, reaching the amazing number of over 20,000 customers in more than 120 countries.

In the mid-1990s it was clear that the standard business software (commonly known as ERPs or Enterprise Resource Planner applications) was mature enough so that many companies chose standard software and could abandon the traditional strategy of local and custom development, which was often more costly in the middle term. At the same time, SAP AG started to gain enough critical mass to take a new step in the development of standard software. This was to start developing software for those company areas that were less standard and more dependent on the business or industry area. These were, for instance, the upstream and downstream systems of oil companies, the call center and customer care systems for telecom or utilities companies, the selling of advertisement in the media sector, and so on. It was necessary to make a move from the back office applications (financial, logistics, human resources) to the front office in the different industry areas. It was also necessary to transform a company selling a product (SAP R/3) independently of the target customer to a company offering specific solutions for the needs of its customers.

SAP AG had enough customers in many different industries to think that the development and selling of specific industry solutions could be profitable.

## SAP for Industries

Until 1996 SAP R/3 was traditionally presented in the classical diamond figure as shown in [Figure 1-1](#). There was an area representing financial applications, an area for logistics, and one for human resources; the central area represented the basis and development system.

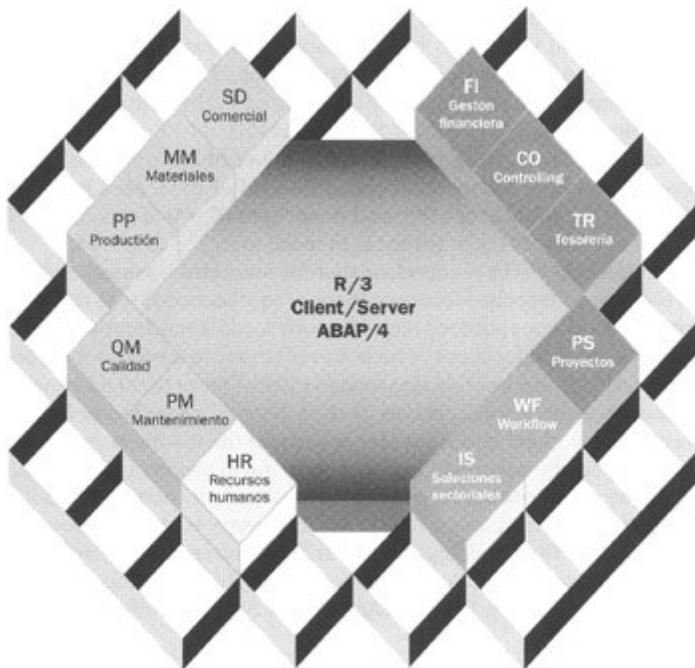


Figure 1-1: SAP R/3 classical representation

In 1996 SAP's industry solutions started to appear. As a base for many of them, SAP used solutions from R/2 or R/3, which had been previously developed by partners or customers in different business areas, like RIVA in the utilities sector for customer billing. The development of these industry solutions was first coordinated through the industry centers of expertise (ICOEs), where SAP's experience in the development of standard software is joined by the business knowledge and requirements of its customers, as well as the experience of big consulting firms for the inclusion of best business practices for each industry sector.

The initial step in developing industry solutions has been steadily consolidated and required SAP to specialize its teams into different industries, called industry business units (IBUs), which included and supplanted the previous ICOEs. These business units are responsible for gathering the market and industry knowledge and developing specific solutions and applications for each of the industry sectors in which SAP is committed to provide. Currently (end of 2005), there are 23 different industry solutions.

Refer to <http://www.sap.com/solutions/industry/> for updated information about SAP-specific industry solutions.

From a technical point of view, the SAP Industry Solutions were a SAP R/3 system with a special and industry-specific add-on that modified some of the standard R/3 transactions and applications to adapt them to that particular industry and that included new functionality relevant to that industry sector.

## **The Emergence of the New Dimension Products**

Around the end of the 1990s, SAP was developing additional modules that initially were included within an IBU, but when looking more closely at these new developments, SAP was aware that some of the requested functionalities for these modules were common to different industry sectors. Examples of such common applications were the Customer Interaction Center or Call Center (CIC) or the Sales Force Automation (SFA), which later became Mobile Sales within the mySAP CRM and which matched those systems that have the objective of automating sales and that can be deployed in industries as different as consumer products, media, pharmaceuticals, and others.

Since these modules could not be grouped under a specific industry solution, they were positioned by SAP as an equivalent to IBUs called Strategic Business Units (SBUs). Initially SAP created three SBUs:

- *SAP Supply Chain Management (SCM)*, which included products such as SAP Advanced Planner and Optimizer (APO), SAP Business to Business (B2B), and SAP Product Data Management (PDM)
- *SAP Customer Relationship Management (CRM)*, which included SAP Sales, SAP Marketing, and SAP Service
- *SAP Business Intelligence (BI)*, which included the SAP Business Information Warehouse and the SAP Knowledge Warehouse (formerly InfoDB)

The New Dimension products evolved to become an integral part of the mySAP Business Suite and SAP NetWeaver integration platform, as we will see in the following sections.

From these SAP products and solutions initiatives and the initial R/3 application modules, SAP has significantly increased the number of solutions that can be sold separately from R/3, some of which can also be deployed together with non-R/3 applications.

## Solution Maps and Business Scenarios Maps

In 1998 SAP was ready to complete its strategic move from being a single-product (R/3) company to being a company offering complete business solutions to its customers.

In 2004, after the adjustment and fine tuning and right placement of the products within the initial mySAP.com offering, what started as complementary solutions became components of the mySAP Business Suite.

SAP offered solutions for different industry sectors when it introduced New Dimension and launched the SAP solution maps.

The solution maps gather not only the R/3 product vision but a full and structured view of the customer business as well. This is achieved with a firm decision to complete the company's catalog of products and services so that it can offer its customers a complete solution, either directly with SAP products and services or with third-party products developed by complementary software partners.

In the SAP solution maps, the customer business processes are collected in the horizontal colored boxes. Different colors signify different processes within the company. To build a complete solution for the customer business it will be necessary to deploy different products. As an example, [Figure 1-2](#) shows the SAP solution map for the media industry.

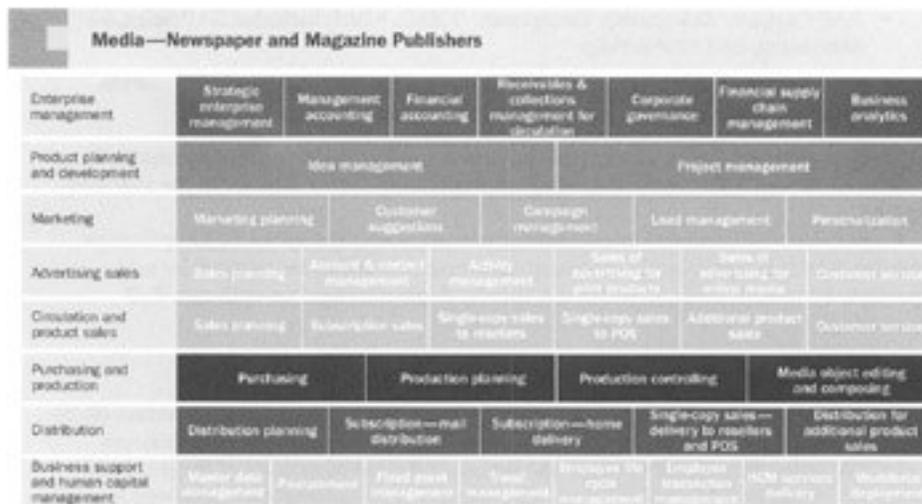


Figure 1-2: SAP solution map for the media industry

In this case, the SAP solution for the media industry would include several modules of SAP R/3 Enterprise, such as FI for financial accounting and asset management, CO for the economic and strategic management of business, TR for treasury, MM for procurement, HR for human resources, and so on. It would then also include mySAP Business Suite applications and SAP NetWeaver components like the SAP Business Warehouse or the mySAP CRM. Finally would come IS-Media with its two modules: Media Advertising Management (MAM) and Media Sales and Distribution (MSD), which include the management of selling advertising for papers, journals, magazines, television, radio, the Internet, and other venues, as well as the management of subscriptions, paper and magazine sales, and distribution.

SAP considers it a must to provide its customers with a complete solution by developing required connections with those systems that must coexist with SAP. In SAP for Media this is the case with production systems that must interface with content servers or with systems for the design and pagination of publications. This was achieved initially by the Business Framework architecture based on open interfaces that could be used by products of complementary software partners. Currently this is enabled by the SAP integration technology represented by SAP NetWeaver.

This structure guarantees SAP customers a complete integration of products, providing a full solution map for the integrated management of their businesses.

## **mySAP.com**

Making a debut in 1999, mySAP.com was the initial SAP strategy for providing electronic commerce solutions in the age of the Net economy. With mySAP.com, SAP aimed to help its customers in their e-business strategies, providing a full set of software and service solutions that completely embraced the Internet strategy with a standard-based technological foundation known as the Internet Business Framework.

At the time of its introduction, mySAP.com was defined as the collaborative e-business platform that included *all* of the SAP solutions, technologies, and services. [Figure 1-3](#) represents the mySAP.com strategy.

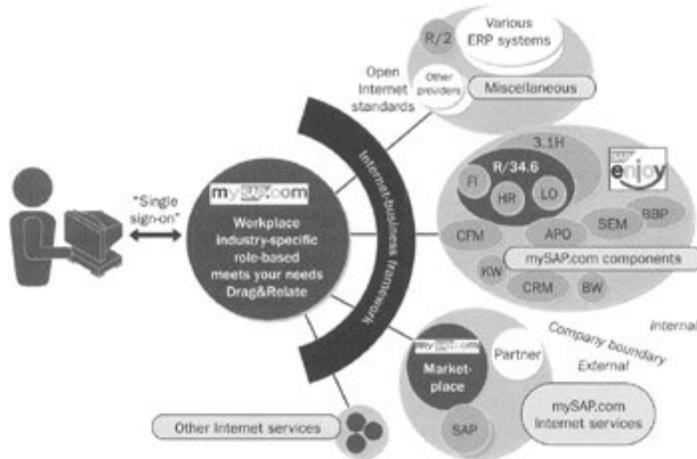


Figure 1-3: mySAP.com strategy

The mySAP concept, and specifically the Enterprise Portal component (initially the mySAP Workplace), was designed by supporting itself in the broad knowledge and experience of the different industries.

The mySAP components included solutions that could cover the specific requirements of companies and their users, such as the following:

- Access to business solution applications
- Access to internal corporate information, reports, and press releases
- Access to services available on the Internet
- Access to any user applications
- Access to marketplaces

In order to support those requirements, the initial mySAP.com offering comprised the following components:

- mySAP.com Workplace
- mySAP.com Business Scenarios
- mySAP.com Application Hosting
- mySAP.com Marketplace

All that came with the underlying technology represented by the solid foundation of the SAP Basis Technology, whose name evolved to mySAP.com Technology.

mySAP.com could also be considered as an open, flexible, and comprehensive e-business solution environment, and, as such, it can integrate all the SAP software solutions but also other non-SAP applications. Clearly, it was the antecessor concept of what it is now the SAP NetWeaver integration platform.

Within mySAP.com companies can design their corporate portal and integrate specific Internet- and Web-based applications.

One of the main design principles of mySAP was to facilitate the integration of business processes not only internally but also among different companies (collaboration), which can be grouped by communities, with the purpose of increasing the effectiveness and productivity by potentially reducing the cost of collaboration within a vast marketplace.

This complex and ambitious goal of mySAP.com was supported by the technological foundation of the Internet Business Framework, so that there was an easy exchange of data and communication among Internet applications using XML; security systems based on standard certificates by certification authorities; content standards; and so on.

## SAP Product Portfolio in the SAP NetWeaver Age

As of the end of 2004, SAP had repositioned its product strategy and solutions and the NetWeaver platform brought new elements or components ([Figure 1-4](#)).

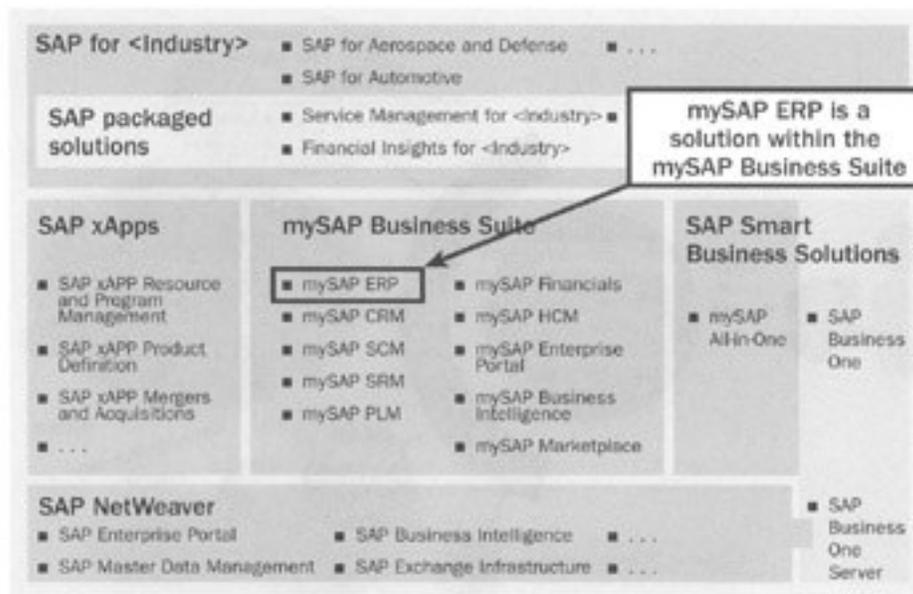


Figure 1-4: SAP product portfolio (2004)

This is a brief introduction, and major elements of this redefined solutions and product portfolio are as follows:

- SAP for <Industry>, based on previous SAP Industry Solutions and for the most part still based on SAP R/3 Basis (4.6C), is being migrated first to Enterprise R/3 and to the SAP Web Application Server and therefore will also have elements of SAP NetWeaver.
- mySAP Business Suite represents the bundle of all cross-industry SAP products, and it's based on the SAP NetWeaver integration platform. Some of the solutions within the Business Suite are mySAP CRM, mySAP SCM, and mySAP ERP. A key player here is mySAP ERP, or, in other words, a broader way of looking at SAP R/3 Enterprise, with the inclusion of additional functions and solutions such as Analytics and mySAP Human Resources. [Figure 1-5](#) shows the role of mySAP

ERP, and [Figure 1-6](#) shows how SAP R/3 has evolved into the current product portfolio.

- SAP xApps, derived from SAP Cross Applications, is also a special development based on Java that allows for the so-called Composite Applications, based on SAP NetWeaver, that allow the integration of specific functions from several of the SAP Solutions.
- SAP Smart Business Solutions, targeted to the market segment of the small and medium business. The products within these solutions include the following:
  - mySAP All-in-One is a special package based on a SAP R/3 system that has been enhanced with functions and applications from other SAP Solutions. This special solution is typically provided by SAP Business Partners that create their own industry-specific solutions (packages) for micro vertical markets.
  - SAP Business One is a special product that is not directly based on the SAP R/3 system, but rather programmed in C++, and that includes the most important and critical functions needed in small and medium businesses, such as accounting and warehouse management.
- SAP NetWeaver, which on one hand represents the technological infrastructure for all the SAP Solutions and on the other defines an integration platform (People Integration, Information Integration, and Process Integration), includes the following components: SAP Enterprise Portal, SAP Business Intelligence, SAP Master Data Management, SAP Exchange Infrastructure, SAP Mobile Business, and SAP Web Application Server. [Chapter 11](#) includes an introduction of SAP NetWeaver architecture and components. [Figure 1-7](#) shows the SAP NetWeaver concept and integration layers.

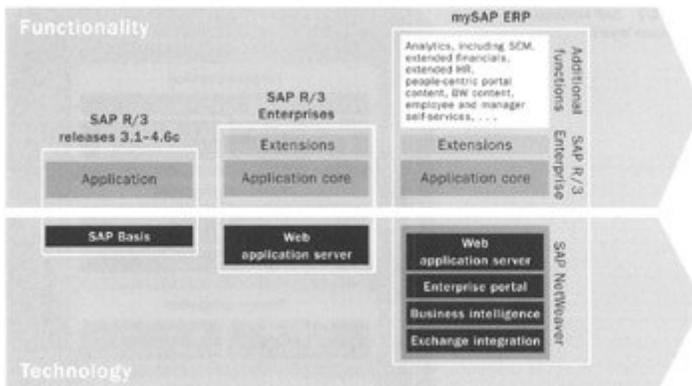


Figure 1-5: mySAP ERP

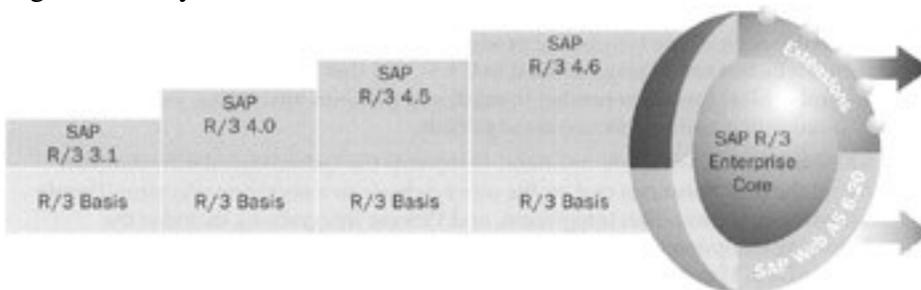


Figure 1-6: Evolution of SAP R/3

## **SAP R/3 Releases and Fundamentals**

SAP R/3 technology was the natural evolution of the SAP R/2 system, and it is the product that has really fueled the expansion of SAP since its introduction in 1992, establishing itself as the leader and de facto standard in the industry. SAP R/3 was the first solid ERP standard client/server system, with a high degree of technological complexity and application functionality.

SAP explains the implicit complexity of R/3 systems by reasoning that the business world is complex, and for a standard system to cover it, it had to include a large number of functions. SAP not only includes business functionality, it also includes efficient implementation tools, a comprehensive development environment, and a full-featured set of tools to monitor and manage the system efficiently.

In the 1990s, SAP R/3 became the system of choice for those companies anchored in character-cell legacy applications wishing to downsize their centralized mainframe class computer system to newer and cheaper client/server technology.

The following sections introduce some of the features of the main R/3 releases, since release 3.0, showing some of the areas where SAP concentrated its strategic efforts and directions.

### **R/3 Release 3.0**

R/3 release 3.0, introduced early in 1996, was a major step forward for SAP, both in starting to build the Business Framework architecture and in making customization tools easier. Some of the most important features introduced in 3.0 were as follows:

- Application Link Enabled (ALE) technology. With these interfaces to link different SAP systems and external application systems, SAP overcomes the problem of having a unique centralized database server and allows big companies to distribute their business processes without losing integration. ALE is still a major component and technology within the Internet Business Framework architecture and even SAP NetWeaver.
- Integration with standard PC applications, mainly the Microsoft Office suite. With this release, SAP included standard links to interact with MS-Excel, MS-Word, MS-Access, and others, using OLE technology.
- Enhanced graphical user interface (GUI) with lots of new options, buttons, captions, and images. There was also a set of utilities for interacting with SAP, such as the SAP Automation, RFC interfaces, and so on, included in standard Desktop SDK.
- Technological enhancements in the architecture of the system, such as new memory management features and easier installation and upgrade procedures.

- New APIs and standard calls for software developers, further opening the system and broadening the spectrum of functionality, with add-ons like Archiving, EDI, forms management, external workflow, plant data collection devices, mail and fax solutions, and so on.
- First steps to a more business-object-oriented system with an enhanced SAP Business Workflow and the introduction of the business objects, which are components of a business workflow.
- The introduction of the Business Framework architecture with the goal of making it faster and easier for customers to introduce new functionalities into the system, as well as making the system even more flexible and open.

## R/3 Release 3.1

By year end 1996, SAP announced the availability of release 3.1. This version was known as the Internet release because the main new features and capabilities related to the possibility of expanding the capacity of the R/3 systems, using the Internet for doing business while preserving the functionality and support of the core R/3 applications. Users would be able to make transactions with the system directly using their Internet browsers. Release 3.1 allows for efficient communication in the business world among companies, customers, and providers.

SAP R/3 release 3.1 was the first to broaden the typical three-tier client/server architecture to a multitier one by introducing a new layer, known as the Internet layer, located between the presentation and application layers. With this approach SAP increased the potential access to the system of thousands of users (better known as *business partners*). To support this new architecture, SAP introduced several modifications to the application level, based on the *thin client* concept, which is in turn based on making a very reduced data transfer between the presentation and the application levels. This is a very important concept considering the limited bandwidth that was often found on Internet connections. And it made available the Internet Transaction Server (ITS).

R/3 release 3.1 offered the same functionality as the previous 3.0 release but enabled the ability of business processes using both intranets and the Internet. Some of its features were as follows:

- *Java enabling*, with the possibility of avoiding the code for the presentation server in clients and making presentation software distribution easier.
- *Introduction of Business Application Program Interfaces (BAPIs)*, which can be used as a mechanism to communicate R/3 with external applications using the Internet. BAPIs are object-oriented definitions of business entities. The concept behind BAPIs was the key in the Business Framework architecture as well as in the overall SAP R/3 Internet and electronic commerce strategy, as the object-oriented interface to integrate external applications. Based on business objects, such as company, vendor, employee, material, and so on, a BAPI defines the methods that can be used to interact and communicate with those objects. Release