



Ton Duc Thang University  
Faculty of Information Technology

# ENTERPRISE RESOURCES PLANNING SYSTEMS (503066)

## INTRODUCTION

# Course Description

- Module's name:  
**ENTERPRISE RESOURCES PLANNING SYSTEMS**
- Code: 503066
- Credits: 3 (3.0)
- Prerequisite: None

# Syllabus Outline

- **Chapter 1: Business functions and business processes**
  - Introduction
  - Functional areas and business processes
  - Functional areas and business processes in a small business
  - Functional area information systems
- **Chapter 2: The development of enterprise resource planning systems**
  - The evolution of information systems
  - ERP software emerges: SAP and R/3
  - New Directions in ERP
  - SAP ERP Software Implementation
  - ERP for midsized and smaller companies
  - Choosing consultants and vendors
  - The significance and benefits of ERP Software and systems
  - Questions about ERP

# Syllabus Outline

- **Chapter 3: Marketing information systems and the sales order process**
  - Case study: Fitter Snacker
  - Sales and distribution in ERP
  - A standard order in SAP ERP
  - Customer relationship management (CRM)
- **Chapter 4: Production and supply chain management information systems**
  - Production overview
  - Case study: Fitter's Manufacturing Process
  - Fitter's Production Problems
  - The production planning process
  - The SAP ERP Approach to Production Planning
  - Providing Production Data to Accounting
  - ERP and suppliers
  - Problems with Fitter Snacker's purchasing process
  - Purchasing process

# Syllabus Outline

- **Chapter 5: Accounting in ERP Systems**
  - Accounting activities
  - The functions of the Accounting module in ERP
  - Using ERP for Accounting Information
  - Management reporting with ERP systems
  - The Enron collapse
  - Implications of the Sarbanes-Oxley Act for ERP systems
  - Trends in financial reporting - XBRL
- **Chapter 6: Human resources processes with ERP**
  - Introduction
  - Problems with Fitter's human resources processes
  - Human resources with ERP software
  - Advanced SAP ERP human resources features
  - Additional human resources features of SAP ERP

# Syllabus Outline

- **Chapter 7: Process modeling, process improvement, and ERP implementation**
  - Process modeling
  - Process improvement
  - ERP workflow tools
  - Implementing ERP systems
  - Implementation and change management
- **Chapter 8: RFID, Business Intelligence (BI), mobile computing, and the cloud**
  - Radio frequency identification (RFID) technology
  - Business intelligence/business analytics
  - In-Memory Computing
  - Mobile Computing
  - SaaS: Software as a Service

# Teaching materials

- **Textbook:**
- [1] Ellen Monk and Bret Wagnerext, [2012], Concepts in Enterprise Resource Planning, 4th edition, Cengage Learning, Boston
- **Supplementary Readings:**
- [2] Magal R. Simha, Word Jeffrey, [2012], Integrated Business processes with ERP Systems, John Willey & Sons Inc, New Jersey
- [3] Vinod Kumar Garg, N. K. Venkitakrishnan, [2003], Enterprise Resource Planning: Concepts and Practice, PHI Learning Pvt. Ltd, New Delhi
- **Additional readings:**
- [4] Ben Rockfeller, [1998], Using SAP R/3 FI, John Wiley, New Jersey
- [5] K. Ganesh, Sanjay Mohapatra, S. P. Anbuudayasankar, P. Sivakumar, [2014], Enterprise Resource Planning: Fundamentals of Design and Implementation, Springer, Cham

# Course Materials

- You can find all lectures, tutorials, and solutions on elit:

<https://drive.google.com/drive/folders/1YjU1Rh6m9HOkH-21nWd08GFCX-vyFGF?usp=sharing>

# Assessment

- 10% - Exercises
- 20% - Midterm test
- 20% - Assignments
- 50% - Final exam

# Q & A



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter One*

*Business Functions and Business  
Processes*

# Policies for students

- These contents are only used for students PERSONALLY.
- Students are NOT allowed to modify or deliver these contents to anywhere or anyone for any purpose.

# Objectives

After completing this chapter, you will be able to:

- Name the main functional areas of operation used in business
- Differentiate between a business process and a business function
- Identify the kinds of data each main functional area produces
- Identify the kinds of data each main functional area needs
- Define integrated information systems, and explain why they are essential in today's globally competitive business environment

# Introduction

- **Enterprise Resource Planning (ERP)** programs:  
Core software used by companies to coordinate information in every area of business
  - Help manage companywide business processes
  - Use common database and shared management reporting tools
- **Business process:** Collection of activities that takes some input and creates an output that is of value to the customer

# Functional Areas and Business Processes

- To understand ERP, you must understand how a business works
  - Functional areas of operation
  - Business processes

# Functional Areas of Operation

- Marketing and Sales (M/S)
- Supply Chain Management (SCM)
- Accounting and Finance (A/F)
- Human Resources (HR)
- **Business functions:** Activities specific to a functional area of operation

# Functional Areas of Operation (cont'd.)

Functional area of operation	Marketing and Sales	Supply Chain Management	Accounting and Finance	Human Resources
Business functions	Marketing a product	Purchasing goods and raw materials	Financial accounting of payments from customers and to suppliers	Recruiting and hiring
	Taking sales orders	Receiving goods and raw materials	Cost allocation and control	Training
	Customer support	Transportation and logistics	Planning and budgeting	Payroll
	Customer relationship management	Scheduling production runs	Cash-flow management	Benefits
	Sales forecasting	Manufacturing goods		Government compliance
	Advertising	Plant maintenance		

Figure 1-1 Examples of functional areas of operation and their business functions

# Functional Areas of Operation (cont'd.)

- Functional areas are interdependent
  - Each requires data from the others
- Better integration of functional areas leads to improvements in communication, workflow, and success of company
- **Information system (IS):** Computers, people, procedures, and software that store, organize, and deliver information

# Business Processes

- Collection of activities that takes one or more kinds of input and creates an output that is of value to customer
  - Customer can be traditional external customer or internal customer
- Thinking in terms of business processes helps managers to look at their organization from the customer's perspective

# Business Processes (cont'd.)

Input	Functional area responsible for input	Process	Output
Request to purchase smartphone	Marketing and Sales	Sales order	Order is generated
Financial help for purchase	Accounting and Finance	Arranging financing in-house	Customer finances through the smartphone company
Fulfillment of order	Supply Chain Management	Shipping and delivery	Customer receives smartphone
Technical support	Marketing and Sales	24-hour help line available	Customer's technical query is resolved

Figure 1-2 Sample business processes related to the sale of a personal smartphone

# Business Processes (cont'd.)

- Businesses must always consider customer's viewpoint in any transaction
- Successful customer interaction
  - Customer (either internal or external) is not required to interact with each business function involved in the process
- Successful business managers view business operations from the perspective of a satisfied customer

# Business Processes (cont'd.)

- Sharing data effectively and efficiently between and within functional areas leads to more efficient business processes
- **Integrated information systems:** Systems in which functional areas share data

# Business Processes (cont'd.)

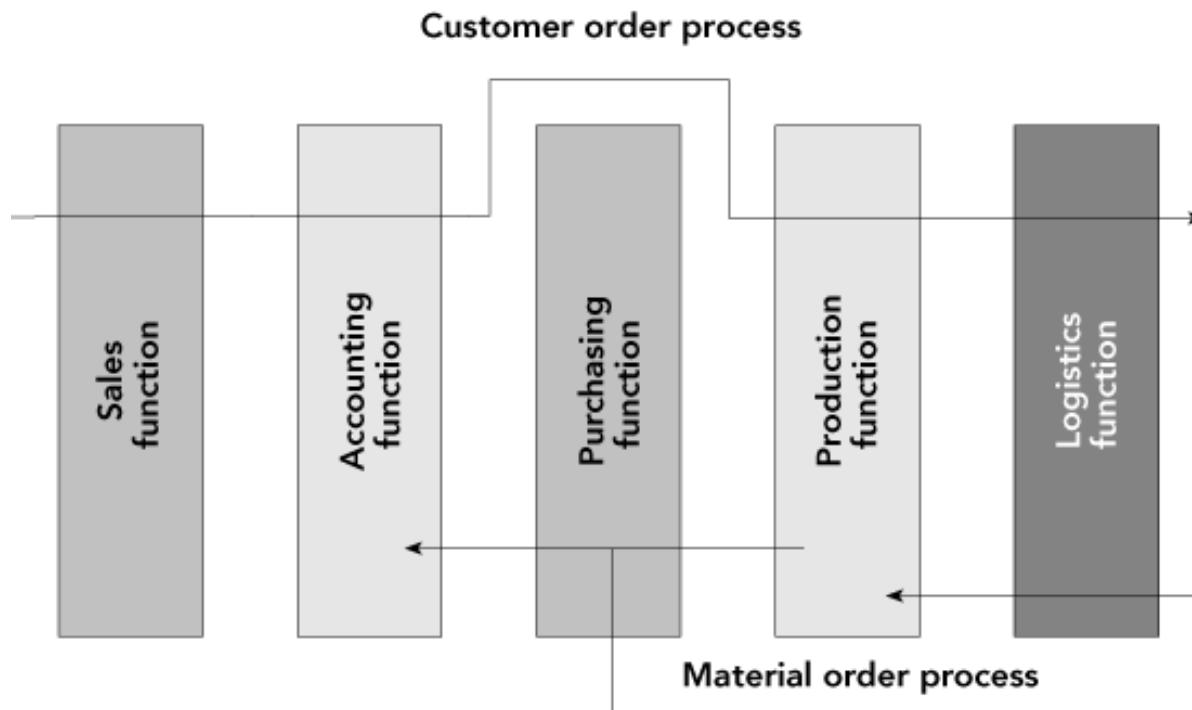


Figure 1-3 A process view of business

# Business Processes (cont'd.)

- Businesses take inputs (resources) and transform these inputs into goods and services for customers
  - Inputs: Material, people, equipment
- Managing inputs and business processes effectively requires accurate and up-to-date information

# Functional Areas and Business Processes of a Very Small Business

- Example: A fictitious coffee shop
  - Examine business processes of the coffee shop
  - See why coordination of functional areas helps achieve efficient and effective business processes
  - Look at how integration of the information system improves the business

# Marketing and Sales

- Functions of Marketing and Sales
  - Developing products
  - Determining pricing
  - Promoting products to customers
  - Taking customers' orders
  - Helping create a sales forecast

# Marketing and Sales (cont'd.)

- Marketing and Sales tasks for the coffee shop
  - Formal recordkeeping not required
  - Need to keep track of customers
  - Product development can be done informally
  - Good repeat customers allowed to charge purchases—up to a point
    - Records must show how much each customer owes and his or her available credit

# Supply Chain Management

- Functions within Supply Chain Management
  - Making the coffee (manufacturing/production)
  - Buying raw materials (purchasing)
- Production planning requires sales forecasts from M/S functional area
  - **Sales forecasts:** Analyses that attempt to predict the future sales of a product

# Supply Chain Management (cont'd.)

- Production plans used to develop requirements for raw materials and packaging
  - Raw materials: Bottled spring water, fresh lemons, artificial sweetener, raw sugar
  - Packaging: Cups, straws, napkins
- SCM and M/S must choose a recipe for each coffee product sold

# Accounting and Finance

- Functions within Accounting and Finance
  - Recording raw data about transactions (including sales), raw material purchases, payroll, and receipt of cash from customers
- **Raw data:** Numbers collected from sales, manufacturing and other operations, without any manipulation, calculation, or arrangement for presentation

# Accounting and Finance (cont'd.)

- Data from Accounting and Finance used by Marketing and Sales and Supply Chain Management
  - Sales records are important component of sales forecast
  - Sales forecast is used in making staffing decisions and in production planning
  - Records from accounts receivable used to monitor the overall credit-granting policy of the coffee shop

# Human Resources

- Functions of Human Resources
  - Recruit, train, evaluate, and compensate employees
- HR uses sales forecasts developed by the individual departments to plan personnel needs
- Systems integrated using ERP software provide the data sharing necessary between functional areas

# Functional Area Information Systems

- Potential inputs and outputs for each functional area described next
- Note the kinds of data needed by each area and how people use the data
- Information systems maintain relationships between all functional areas and processes

# Marketing and Sales

- Needs information from all other functional areas
- Customers communicate orders to M/S in person or by telephone, e-mail, fax, the Web, etc.
- M/S has a role in determining product prices
  - Pricing might be determined based on a product's unit cost, plus some percentage markup
  - Requires information from Accounting and Finance, and Supply Chain Management data

# Marketing and Sales (cont'd.)

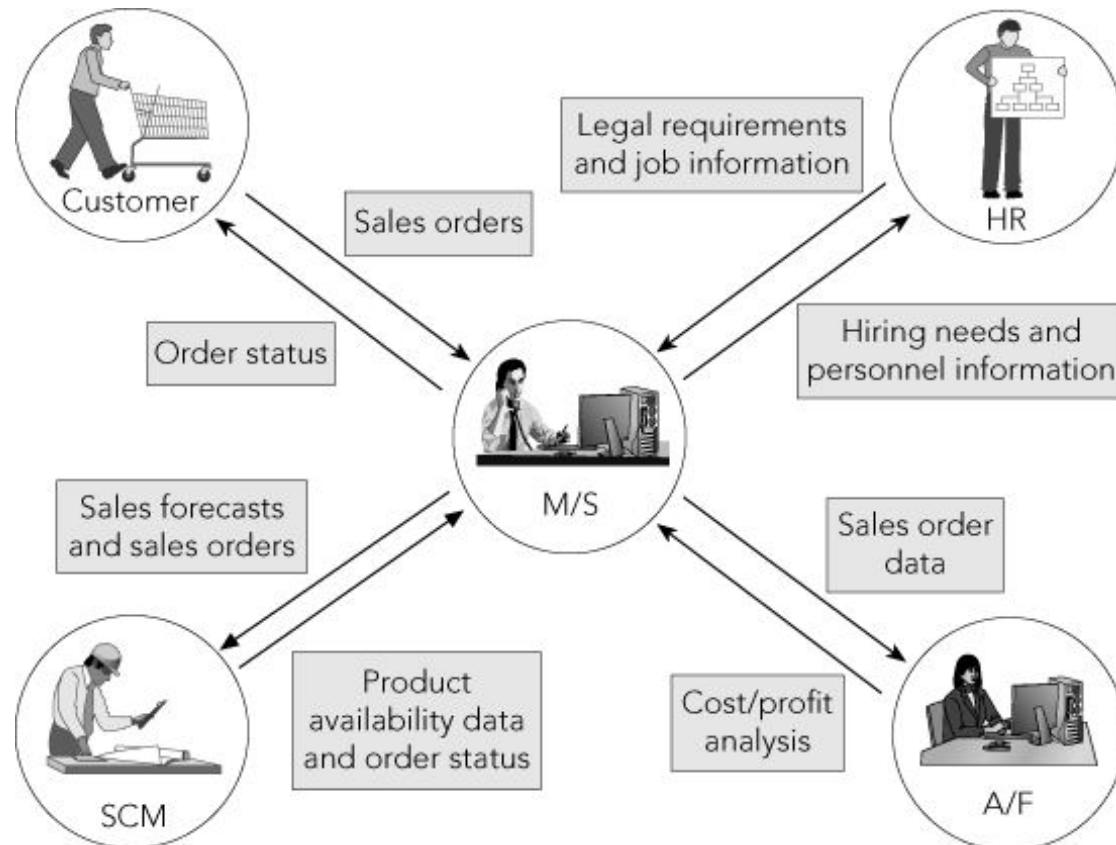


Figure 1-4 The Marketing and Sales functional area exchanges data with customers and with the Human Resources, Accounting and Finance, and Supply Chain Management functional areas

# Marketing and Sales (cont'd.)

- M/S needs to interact with Human Resources to exchange information on hiring needs, legal requirements, etc.
- Inputs for M/S
  - Customer data
  - Order data
  - Sales trend data
  - Per-unit cost
  - Company travel expense policy

# Marketing and Sales (cont'd.)

- Outputs for M/S
  - Sales strategies
  - Product pricing
  - Employment needs

# Supply Chain Management

- Needs information from various functional areas
- Production plans based on information about product sales (actual and projected) that comes from Marketing and Sales
- With accurate data about required production levels:
  - Raw material and packaging can be ordered as needed
  - Inventory levels can be kept low, saving money

# Supply Chain Management (cont'd.)

- Supply Chain Management data and records can:
  - Provide data needed by Accounting and Finance to determine how much of each resource was used
  - Support the M/S function by providing information about what has been produced and shipped
- Supply Chain Management interacts in some ways with Human Resources

# Supply Chain Management (cont'd.)

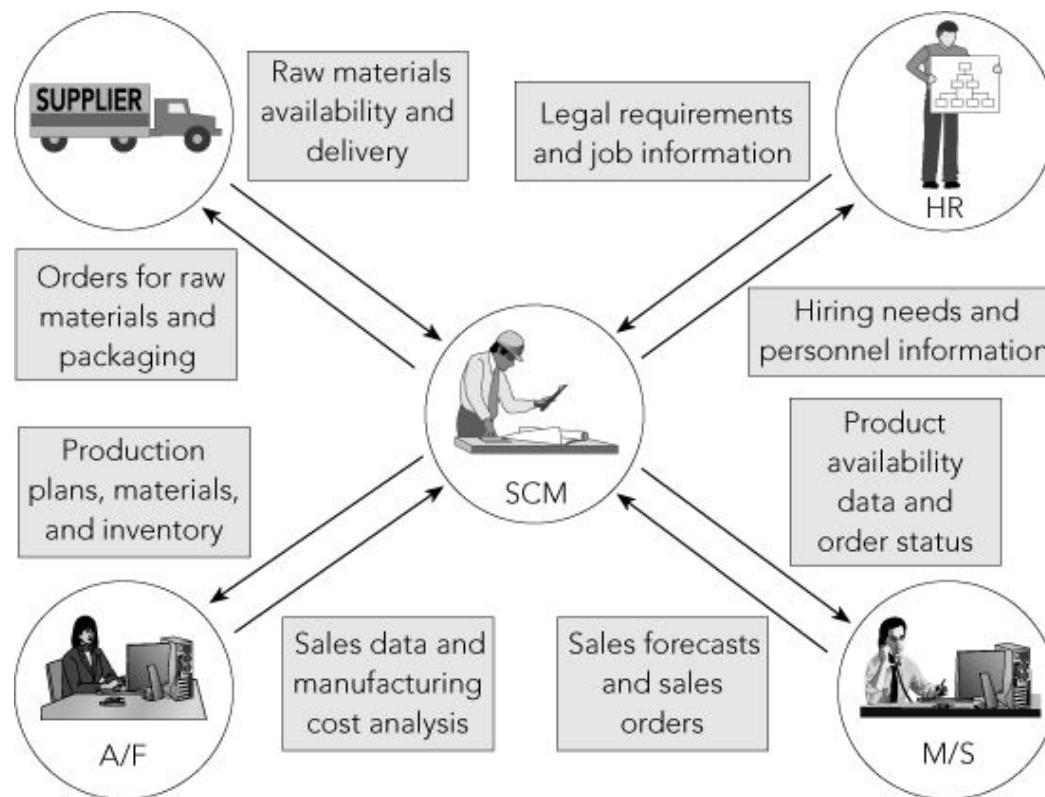


Figure 1-5 The Supply Chain Management functional area exchanges data with suppliers and with the Human Resources, Marketing and Sales, and Accounting and Finance functional areas

# Supply Chain Management (cont'd.)

- Inputs for SCM
  - Product sales data
  - Production plans
  - Inventory levels
  - Layoff and recall company policy

# Supply Chain Management (cont'd.)

- Outputs for SCM
  - Raw material orders
  - Packaging orders
  - Resource expenditure data
  - Production and inventory reports
  - Hiring information

# Accounting and Finance

- Needs information from all other functional areas
- A/F personnel:
  - Record company's transactions in the books of account
  - Record accounts payable when raw materials are purchased and cash outflows when they pay for materials
  - Summarize transaction data to prepare reports about company's financial position and profitability

# Accounting and Finance (cont'd.)

- People in other functional areas provide data to A/F
  - M/S provides sales data
  - SCM provides production and inventory data
  - HR provides payroll and benefit expense data
- M/S personnel require data from A/F to evaluate customer credit

# Accounting and Finance (cont'd.)

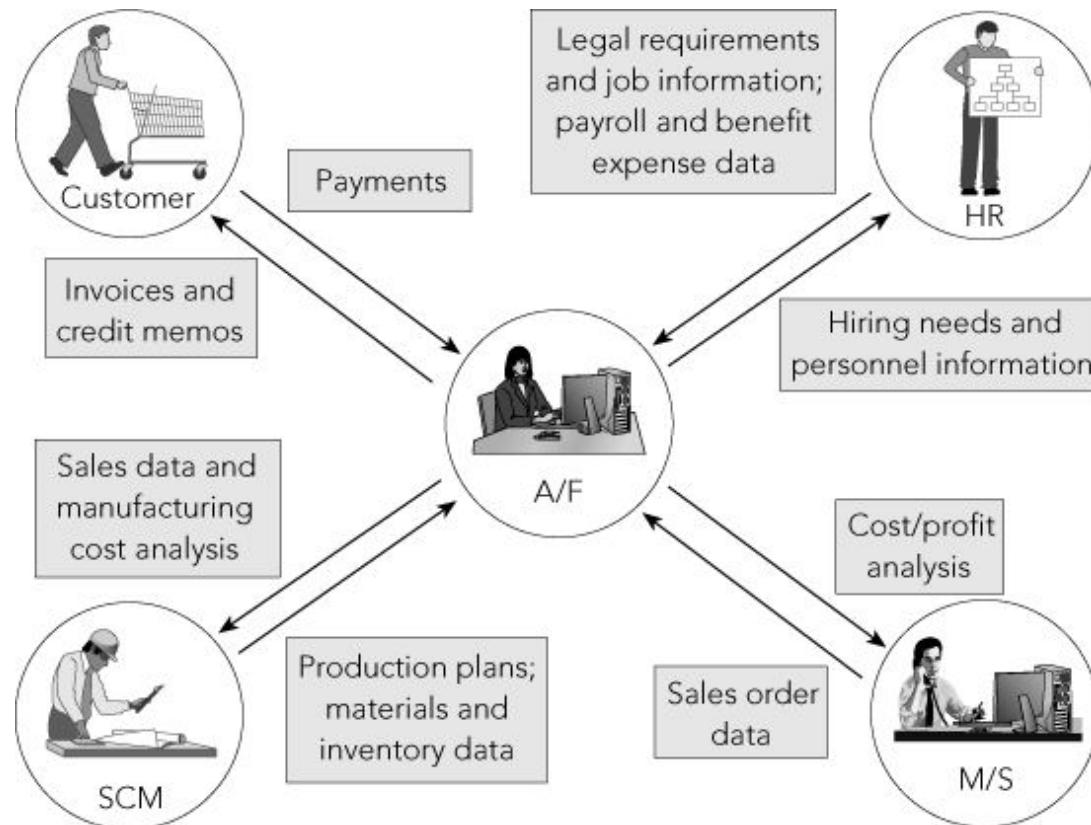


Figure 1-6 The Accounting and Finance functional area exchanges data with customers and with the Human Resources, Marketing and Sales, and Supply Chain Management functional areas

# Accounting and Finance (cont'd.)

- Inputs for A/F
  - Payments from customers
  - Accounts receivable data
  - Accounts payable data
  - Sales data
  - Production and inventory data
  - Payroll and expense data

# Accounting and Finance (cont'd.)

- Outputs for A/F
  - Payments to suppliers
  - Financial reports
  - Customer credit data

# Human Resources

- HR needs information from the other departments
- Tasks related to employee hiring, benefits, training, and government compliance are all responsibilities of HR
- HR needs accurate forecasts of personnel needs from all functional units
- HR needs to know what skills are needed to perform a particular job and how much the company can afford to pay employees

# Human Resources (cont'd.)

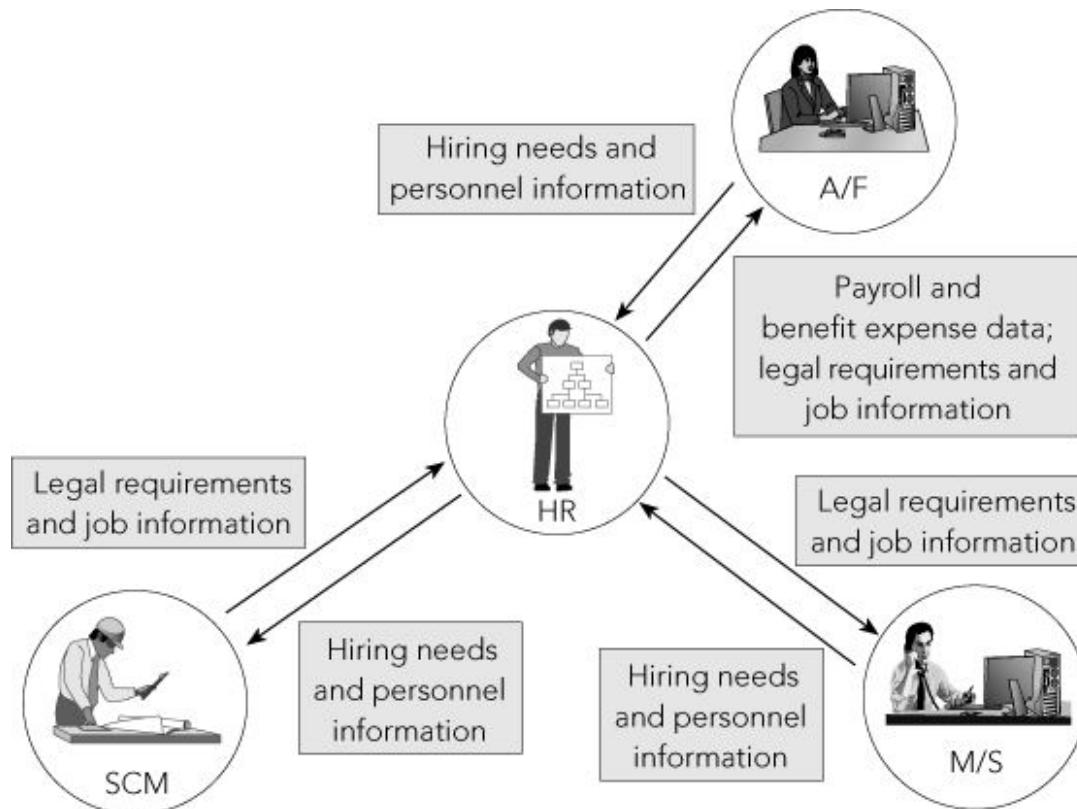


Figure 1-7 The Human Resources functional area exchanges data with the Accounting and Finance, Marketing and Sales, and Supply Chain Management functional areas

# Human Resources (cont'd.)

- Observing governmental regulations in recruiting, training, compensating, promoting, and terminating employees
- Inputs for HR
  - Personnel forecasts
  - Skills data

# Human Resources (cont'd.)

- Outputs for HR
  - Regulation compliance
  - Employee training and certification
  - Skills database
  - Employee evaluation and compensation

# Human Resources (cont'd.)

- Significant amount of data is maintained by and shared among the functional areas
- Timeliness and accuracy of these data critical to each area's success and to company's ability to make a profit and generate future growth
- ERP software allows all functional areas to share a common database
  - Allows accurate, real-time information to be available

# Summary

- Basic functional areas: Marketing and Sales, Supply Chain Management, Accounting and Finance, and Human Resources
- Marketing and Sales: Sets product prices, promotes products through advertising and marketing, takes customer orders, supports customers, and creates sales forecasts
- Supply Chain Management: Develops production plans, orders raw materials from suppliers, receives raw material, manufactures products, maintains facilities, and ships products to customers

# Summary (cont'd.)

- Accounting and Finance: Financial accounting to provide summaries of operational data in managerial reports, controlling accounts, planning and budgeting, and cash-flow management
- Human Resources: Recruits, hires, trains, and compensates employees, ensures compliance with government regulations, and oversees the evaluation of employees
- Information systems capture, process, and store data to provide information needed for decision making

# Summary (cont'd.)

- Employees working in one functional area need data from employees in other functional areas
  - Functional area information systems should be integrated, so shared data are accurate and timely
- Managers think in terms of business processes that integrate the functional areas
  - Need to share information between functions and functional areas
  - ERP software provides this capability by means of a single common database



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Two*

*The Development of Enterprise  
Resource Planning Systems*

# Policies for students

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# Objectives

After completing this chapter, you will be able to:

- Identify the factors that led to the development of Enterprise Resource Planning (ERP) systems
- Describe the distinguishing modular characteristics of ERP software
- Discuss the pros and cons of implementing an ERP system
- Summarize ongoing developments in ERP

# Introduction

- Efficient, integrated information systems are very important for companies to be competitive
- An Enterprise Resource Planning (ERP) system can help integrate a company's operations
  - Acts as a company-wide computing environment
  - Includes a database that is shared by all functional areas
  - Can deliver consistent data across all business functions in real time

# The Evolution of Information Systems

- **Silos**
  - Information systems configuration used until recently
  - Companies had unintegrated information systems that supported only the activities of individual business functional areas
- Current ERP systems evolved as a result of:
  - Advancement of hardware and software technology
  - Development of a vision of integrated information systems
  - Reengineering of companies to shift from a functional focus to a business process focus

# Computer Hardware and Software Development

- Computer hardware and software developed rapidly in the 1960s and 1970s
- First practical business computers were the mainframe computers of the 1960s
- Over time, computers got faster, smaller, and cheaper
- Moore's Law
  - Number of transistors that could be built into a computer chip doubled every 18 months

# Computer Hardware and Software Development

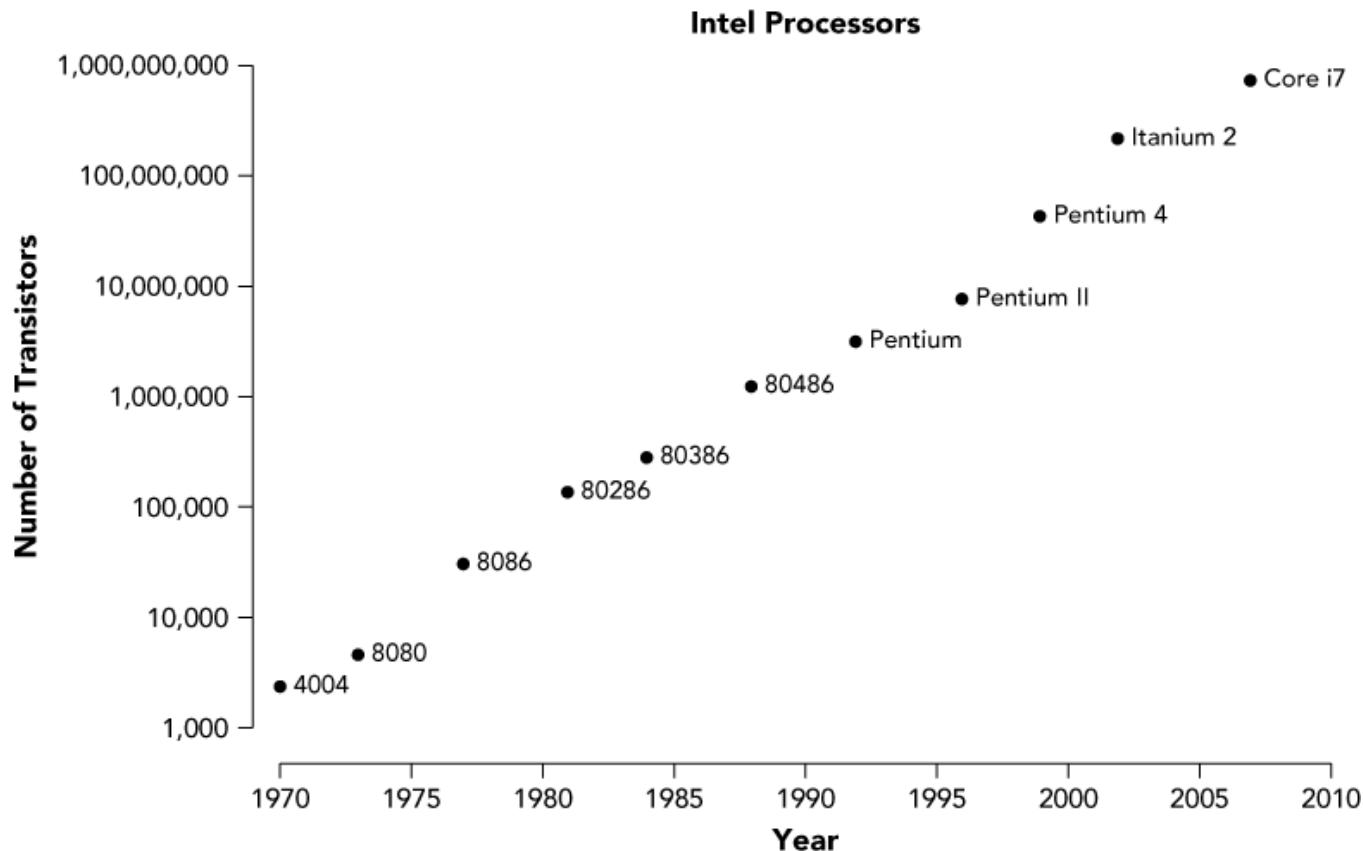


Figure 2-1 The actual increase in transistors on a chip approximates Moore's Law

# Computer Hardware and Software Development (cont'd.)

- Advancements in computer software
  - 1970s: relational database software developed
    - Provide businesses the ability to store, retrieve, and analyze large volumes of data
  - 1980s: spreadsheet software became popular
    - Managers can easily perform complex business analyses

# Early Attempts to Share Resources

- By the mid-1980s, telecommunications developments allowed users to share data and peripherals on local networks
  - **Client-server architecture**
- By the end of the 1980s, the hardware needed to support development of ERP systems was in place
- By the mid-1980s, **database management system (DBMS)** required to manage development of complex ERP software existed

# The Manufacturing Roots of ERP

- Manufacturing software developed during the 1960s and 1970s
  - Evolved from simple inventory-tracking systems to **material requirements planning (MRP)** software
- **Electronic data interchange (EDI)**
  - Direct computer-to-computer exchange of standard business documents
  - Allowed companies to handle the purchasing process electronically

# Management's Impetus to Adopt ERP

- Hard economic times of the late 1980s and early 1990s caused many companies to downsize and reorganize
  - Stimulus to ERP development
- Inefficiencies caused by the functional model of business organization
  - Silos of information
  - Limits the exchange of information between the lower operating levels

# Management's Impetus to Adopt ERP (cont'd.)

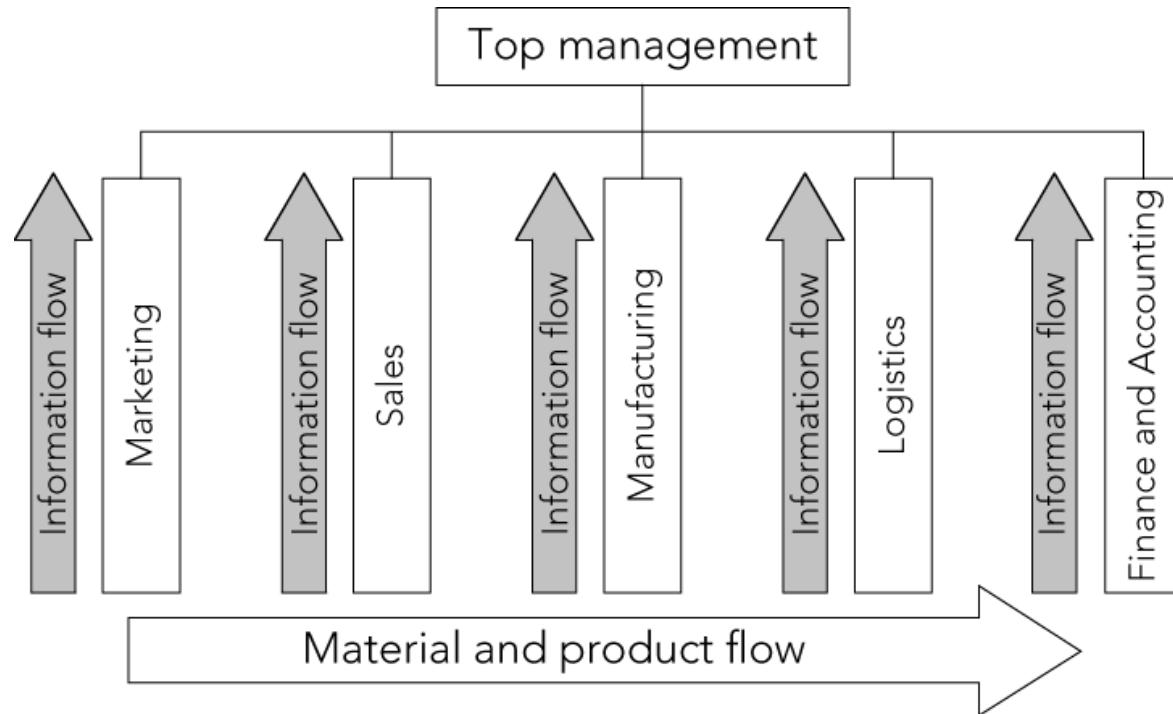


Figure 2-2 Information and material flows in a functional business model

# Management's Impetus to Adopt ERP (cont'd.)

- Functional model led to top-heavy and overstaffed organizations incapable of reacting quickly to change
- Process business model
  - Information flows between the operating levels without top management's involvement
- Further impetus for adopting ERP systems has come from compliance with the Sarbanes-Oxley Act of 2002
  - Requires companies to substantiate internal controls on all information

# Management's Impetus to Adopt ERP (cont'd.)

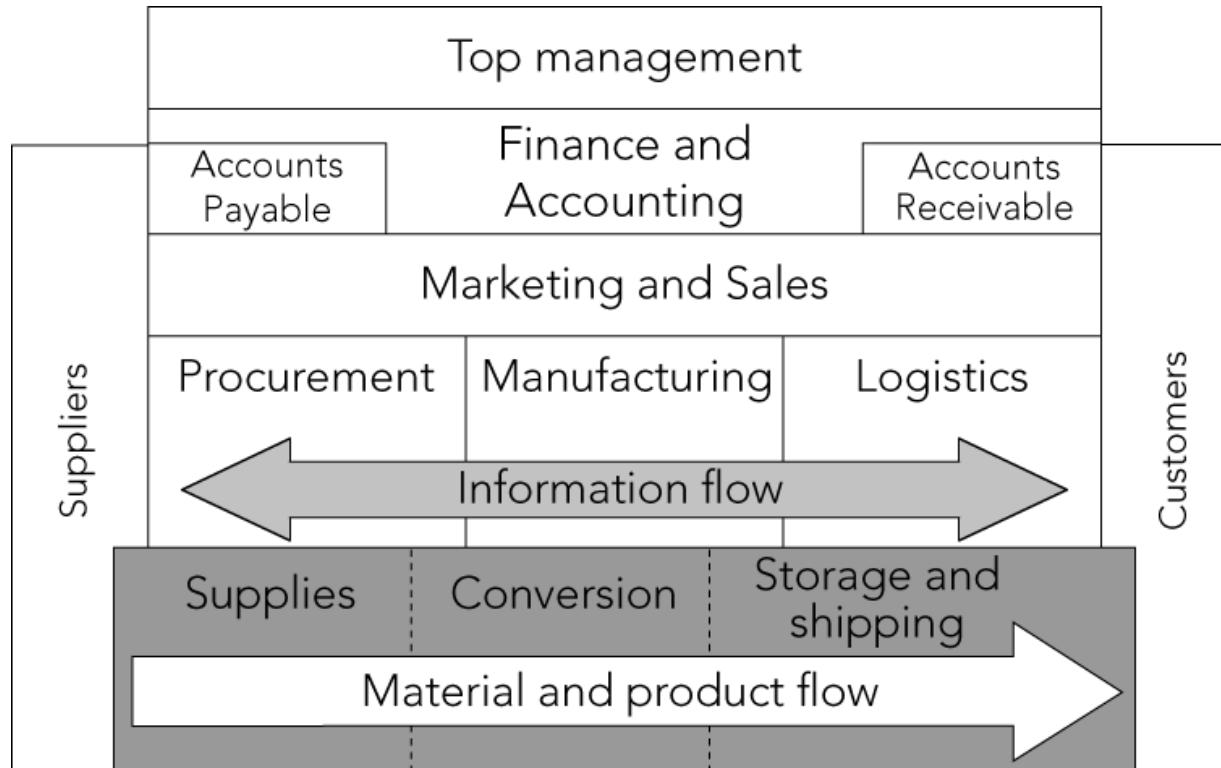


Figure 2-3 Information and material flows in a process business model

# ERP Software Emerges: SAP and R/3

- 1972: five former IBM systems analysts in Mannheim, Germany formed *Systemanalyse und Programmentwicklung* (Systems Analysis and Program Development, or SAP)
- SAP's goals:
  - Develop a standard software product that could be configured to meet the needs of each company
  - Data available in real time
  - Users working on computer screens, rather than with voluminous printed output

# SAP Begins Developing Software Modules

- During their work for German chemical company ICI, Plattner and Hopp had developed the idea of modular software development
- Software **modules**: individual programs that can be purchased, installed, and run separately, but that all extract data from the common database
- 1982: SAP released its R/2 mainframe ERP software package

# SAP Begins Developing Software Modules (cont'd.)

- 1980s: sales grew rapidly; SAP extended its software's capabilities and expanded into international markets
- By 1988, SAP had established subsidiaries in numerous foreign countries

# SAP R/3

- 1988: SAP began development of its **R/3** system to take advantage of client-server technology
- 1992: first version of SAP R/3 released
- SAP R/3 system was designed using an open architecture approach
- **Open architecture:** third-party software companies encouraged to develop add-on software products that can be integrated with existing software

# New Directions in ERP

- Late 1990s: Year 2000 (or Y2K) problem motivated many companies to move to ERP systems
- By 2000, SAP AG had 22,000 employees in 50 countries and 10 million users at 30,000 installations around the world
- By 2000, SAP's competition in the ERP market:
  - Oracle
  - PeopleSoft
- Late 2004: Oracle succeeded in its bid to take over PeopleSoft

# New Directions in ERP (cont'd.)

- PeopleSoft
  - Founded by David Duffield, a former IBM employee
  - Today, PeopleSoft, under Oracle, is a popular software choice for managing human resources and financial activities at universities
- Oracle
  - SAP's biggest competitor
  - Began in 1977 as Software Development Laboratories (SDL)
  - Founders: Larry Ellison, Bob Miner, and Ed Oates

# New Directions in ERP (cont'd.)

- SAP ERP
  - Latest versions of ERP systems by SAP and other companies allow:
    - All business areas to access the same database
    - Elimination of redundant data and communications lags
    - Data to be entered once and then used throughout the organization

# New Directions in ERP (cont'd.)

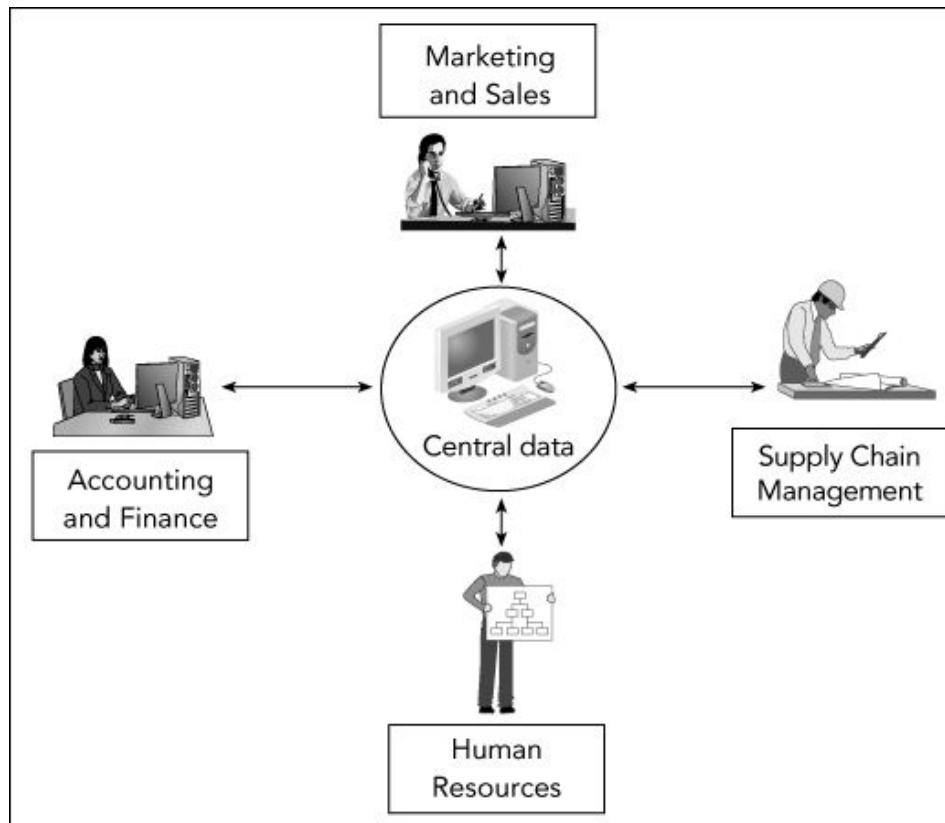


Figure 2-4 Data flow within an integrated information system

# New Directions in ERP (cont'd.)

- Current SAP ERP system: SAP ECC 6.0 (Enterprise Central Component 6.0)
  - Sales and Distribution (SD) module
  - Materials Management (MM) module
  - Production Planning (PP) module
  - Quality Management (QM) module
  - Plant Maintenance (PM) module
  - Asset Management (AM) module

# New Directions in ERP (cont'd.)

- Current SAP ERP system: SAP ECC 6.0 (Enterprise Central Component 6.0) (cont'd.)
  - Human Resources (HR) module
  - Project System (PS) module
  - Financial Accounting (FI) module
  - Controlling (CO) module
  - Workflow (WF) module

# New Directions in ERP (cont'd.)

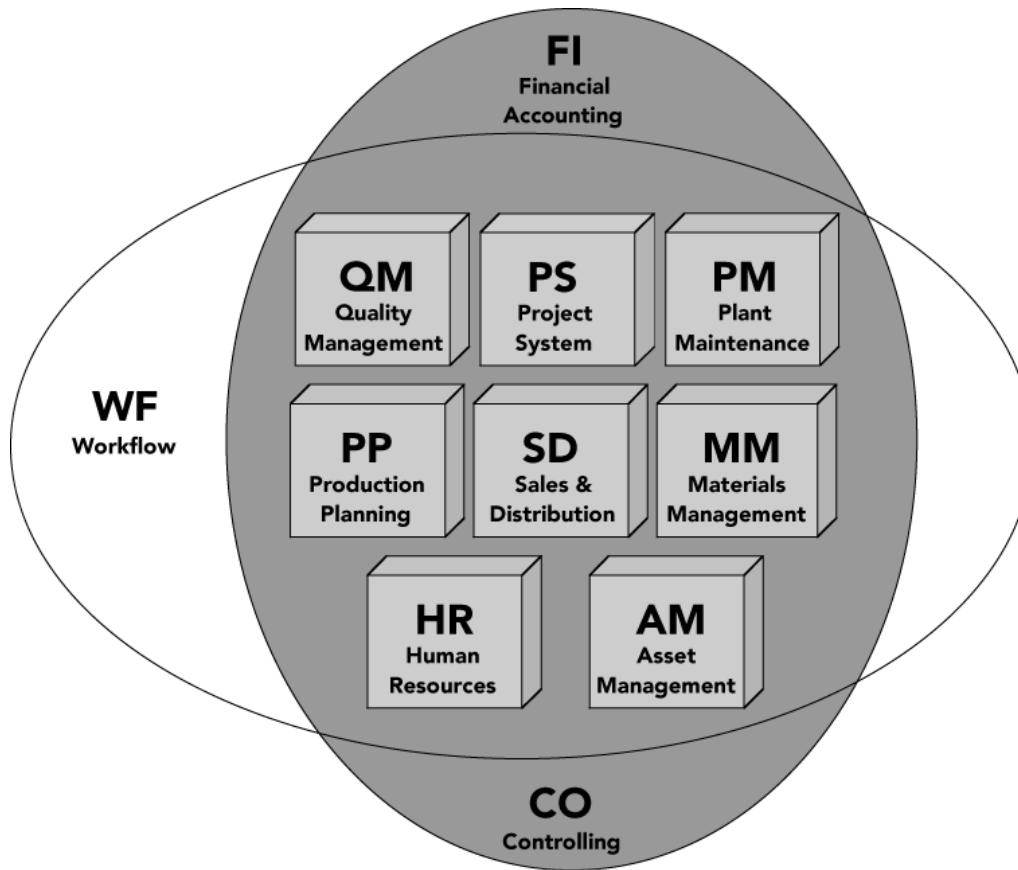


Figure 2-5 Modules within the SAP ERP integrated information systems environment (Courtesy of SAP AG)

# SAP ERP Software Implementation

- Not all companies that use SAP use all of the SAP ERP modules
- Company's level of data integration is highest when it uses one vendor to supply all of its modules
- Configuration options allow the company to customize the modules it has chosen to fit the company's needs

# SAP ERP Software Implementation (cont'd.)

- Tolerance groups
  - Specific ranges that define transaction limits
  - SAP has defined the tolerance group methodology as its method for placing limits on an employee
  - Configuration allows the company to further tailor tolerance group methodology

# SAP ERP Software Implementation (cont'd.)

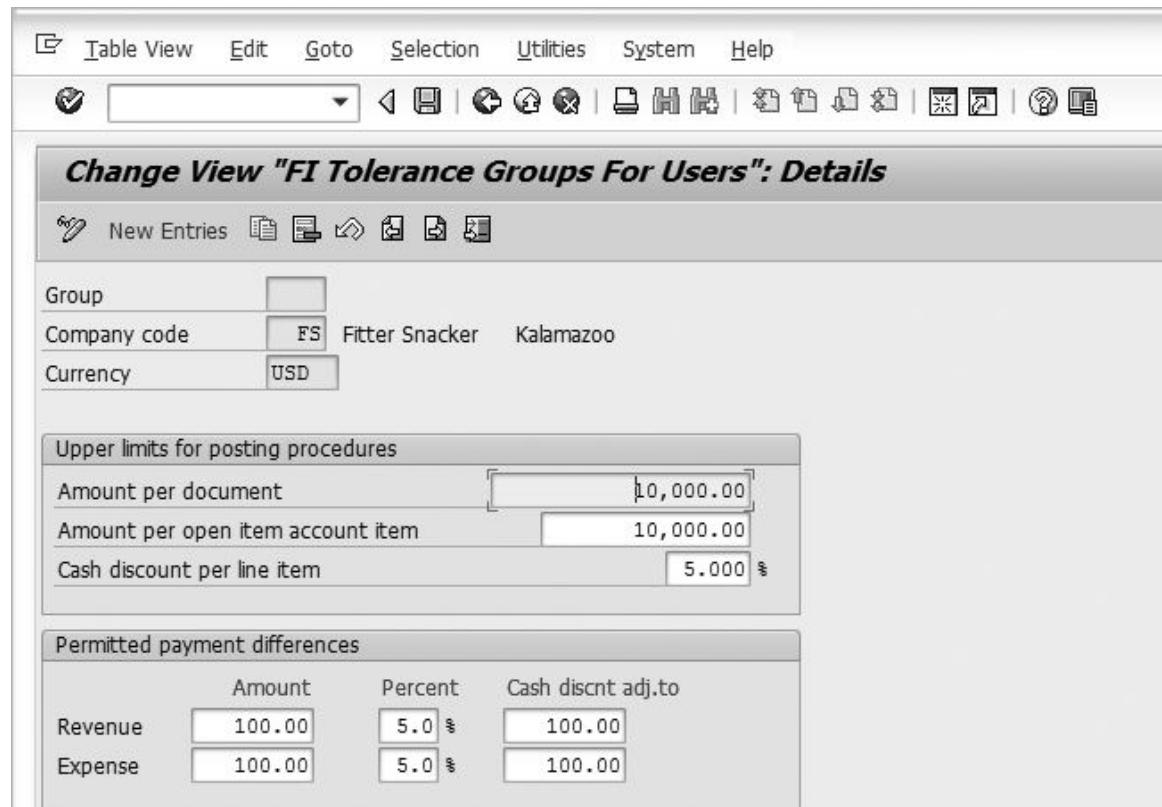


Figure 2-6 A customization example: tolerance groups to set transaction limits

# SAP ERP Software Implementation (cont'd.)

- Features of SAP ERP
  - First software that could deliver real-time ERP integration
  - Usability by large companies
  - High cost
  - Automation of data updates
  - Applicability of best practices
    - **Best practices:** SAP's software designers choose the best, most efficient ways in which business processes *should* be handled

# ERP for Midsized Companies

- By 1998
  - Most of the Fortune 500 companies had already installed ERP systems
  - ERP vendors refocused their marketing efforts on midsized companies
- SAP All-in-One
  - Single package containing specific, preconfigured bundles of SAP ERP tailored for particular industries
  - Can be installed more quickly than the standard ERP product

# ERP for Midsized Companies (cont'd.)

- Application hosting
  - Third-party company provides the hardware and software support
  - Makes ERP systems like SAP more appealing to midsized companies
- SAP and Oracle are facing competition from smaller providers of ERP software

# Responses of the Software to the Changing Market

- In mid-1990s, many companies complained about the difficulty of implementing SAP R/3 system
- SAP responded by developing Accelerated SAP (ASAP) implementation methodology
  - Eases the implementation process
- SAP continues to extend capabilities of SAP ERP with additional, separate products that run on separate hardware and extract data from the SAP ERP system

# Choosing Consultants and Vendors

- One person cannot fully understand a single ERP system
- Before choosing a software vendor, most companies:
  - Study their needs
  - Hire an external team of software consultants to help choose the right software vendor(s) and the best approach to implementing ERP

# The Significance and Benefits of ERP Software and Systems

- More efficient business processes that cost less than those in unintegrated systems
- Easier global integration
- Integrates people and data while eliminating the need to update and repair many separate computer systems
- Allows management to manage operations, not just monitor them
- Can dramatically reduce costs and improve operational efficiency

# Questions About ERP

- How much does an ERP system cost?
- Should every business buy an ERP package?
- Is ERP software inflexible?
- What return can a company expect from its ERP investment?
- How long does it take to see a return on an ERP investment?
- Why do some companies have more success with ERP than others?

# How Much Does an ERP System Cost?

- Size of the ERP software
  - Corresponds to the size of the company it serves
- Need for new hardware that is capable of running complex ERP software
- Consultants' and analysts' fees
- Time for implementation
  - Causes disruption of business
- Training
  - Costs both time and money

# Should Every Business Buy an ERP Package?

- Some of a business's operations, and some segments of its operations, might not be a good match with the constraints of ERP
- Sometimes, a company is not ready for ERP
- ERP implementation difficulties result when management does not fully understand its current business processes and cannot make implementation decisions in a timely manner

# Is ERP Software Inflexible?

- Many people claim that ERP systems, especially the SAP ERP system, are rigid
- Options for customization offered by SAP ERP
  - Numerous configuration options that help businesses customize the software to fit their needs
  - Programmers can write specific routines using **Advanced Business Application Programming (ABAP)**
- Once an ERP system is in place, trying to reconfigure it while retaining data integrity is expensive and time-consuming

# What Return Can a Company Expect from Its ERP Investment?

- ERP eliminates redundant efforts and duplicated data; can generate savings in operations expense
- ERP system can help produce goods and services more quickly
- Company that doesn't implement an ERP system might be forced out of business by competitors that have an ERP system
- Smoothly running ERP system can save a company's personnel, suppliers, distributors, and customers much frustration

# What Return Can a Company Expect from Its ERP Investment? (cont'd.)

- Cost savings and increased revenues occur over many years
  - Difficult to put an exact dollar figure to the amount accrued from the original ERP investment
- ERP implementations take time
  - Other business factors may be affecting the company's costs and profitability
  - Difficult to isolate the impact of the ERP system alone
- ERP systems provide real-time data
  - Improve external customer communications

# How Long Does It Take to See a Return on an ERP Investment?

- **Return on investment (ROI):** assessment of an investment project's value
  - Calculated by dividing the value of the project's benefits by the project's cost
- ERP system's ROI can be difficult to calculate
- Peerstone Research study ROI: return on investment
  - 63 percent of companies that performed the calculation reported a positive ROI for ERP
  - Most companies felt that nonfinancial goals were the reason behind their ERP installations

# Why Do Some Companies Have More Success with ERP Than Others?

- Usually, a bumpy rollout and low ROI are caused by *people* problems and misguided expectations, not computer malfunctions
  - Executives blindly hoping that new software will cure fundamental business problems that are not curable by any software
  - Executives and IT managers not taking enough time for a proper analysis during planning and implementation phase
  - Executives and IT managers skimping on employee education and training

# Why Do Some Companies Have More Success with ERP Than Others? (cont'd.)

- Usually, a bumpy rollout and low ROI are caused by *people* problems and misguided expectations, not computer malfunctions (cont'd.)
  - Companies not placing ownership or accountability for the implementation project on the personnel who will operate the system
  - Unless a large project such as an ERP installation is promoted from the top down, it is doomed to fail
  - ERP implementation brings a tremendous amount of change for users

# Why Do Some Companies Have More Success with ERP Than Others? (cont'd.)

- For many users, it takes years before they can take advantage of many of an ERP system's capabilities
- Most ERP installations do generate returns

# The Continuing Evolution of ERP

- Understanding the social and business implications of new technologies is not easy
- ERP systems have been in common use only since the mid-1990s
- ERP vendors are working to solve adaptability problems that plague customers

# Summary

- Speed and power of computing hardware increased exponentially, while cost and size decreased
- Early client-server architecture provided the conceptual framework for multiple users sharing common data
- Increasingly sophisticated software facilitated integration, especially in two areas: A/F and manufacturing resource planning

# Summary (cont'd.)

- Growth of business size, complexity, and competition made business managers demand more efficient and competitive information systems
- SAP AG produced a complex, modular ERP program called R/3
  - Could integrate a company's entire business by using a common database that linked all operations
- SAP R/3, now called SAP ERP, is modular software offering modules for Sales and Distribution, Materials Management, Production Planning, Quality Management, and other areas

# Summary (cont'd.)

- ERP software is expensive to purchase and time-consuming to implement, and it requires significant employee training—but the payoffs can be spectacular
  - For some companies, ROI may not be immediate or even calculable
- Experts anticipate that ERP's future focus will be on managing customer relationships, improving planning and decision making, and linking operations to the Internet and other applications through service-oriented architecture



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Three*  
*Marketing Information Systems and  
the Sales Order Process*

# Policies for students

- These contents are only used for students PERSONALLY.
- Students are NOT allowed to modify or deliver these contents to anywhere or anyone for any purpose.

# Objectives

After completing this chapter, you will be able to:

- Describe the unintegrated sales processes of the fictitious Fitter Snacker company
- Explain why unintegrated Marketing and Sales information systems lead to company-wide inefficiency, higher costs, lost profits, and customer dissatisfaction
- Discuss sales and distribution in the SAP ERP system, and explain how integrated data sharing increases company-wide efficiency

# Objectives (cont'd.)

- Describe how SAP ERP processes a standard sales order
- Describe the benefits of customer relationship management (CRM) software

# Introduction

- Fitter Snacker (FS)
  - Fictitious company that makes healthy snack bars
  - Does not have an integrated information system
- Marketing and Sales (M/S) is the focal point of many of FS's activities
- FS's M/S information systems are not well integrated with company's other information systems
  - Company-wide use of transaction data is inefficient

# Overview of Fitter Snacker

- Manufactures and sells two types of nutritious snack bars:
  - NRG-A: “advanced energy”
  - NRG-B: “body building proteins”
- Has organized its sales force into two groups, known as divisions:
  - Wholesale Division
  - Direct Sales Division

# Overview of Fitter Snacker (cont'd.)

- The two sales divisions differ in terms of quantities of orders and pricing terms
- Sells snack bars under the Fitter Snacker brand name
- Packages the bars in store-brand wrappers for some chain stores

# Problems with Fitter Snacker's Sales Process

- Many of Fitter Snacker's sales orders have problems, such as:
  - Incorrect pricing
  - Excessive calls to the customer for information
  - Delays in processing orders
  - Missed delivery dates

# Problems with Fitter Snacker's Sales Process (cont'd.)

- Reasons for problems:
  - FS has separate information systems throughout the company for three functional areas:
    - Sales order system
    - Warehouse system
    - Accounting system
  - High number of transactions that are handled manually
  - Information stored in the three systems is not available in real time

# Problems with Fitter Snacker's Sales Process (cont'd.)

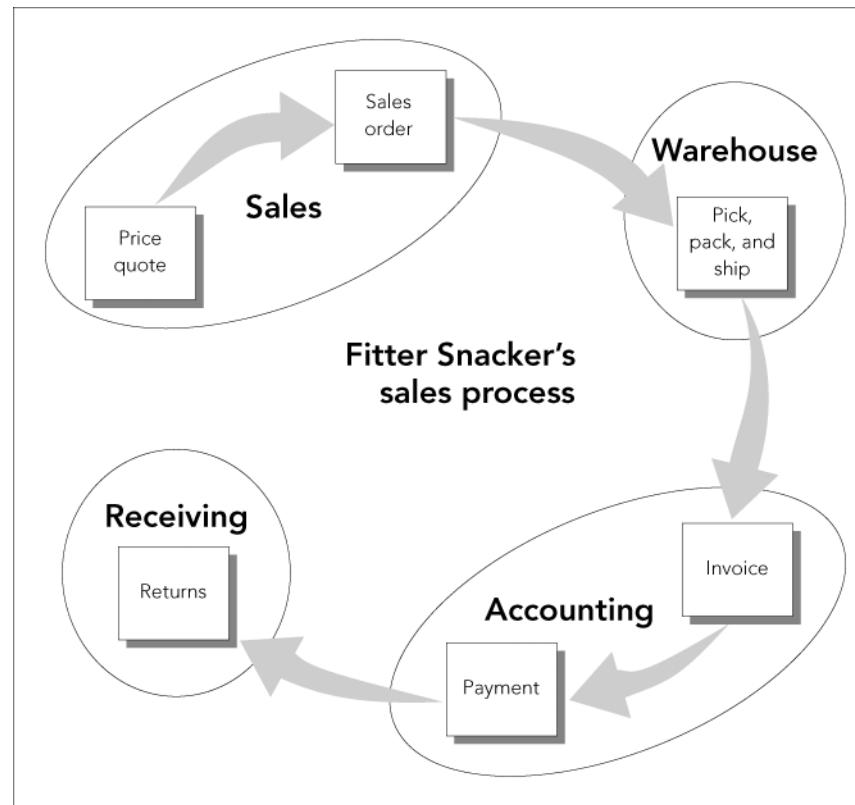


Figure 3-1 The sales process

# Sales Quotations and Orders

- Giving a customer a price quotation and then taking the customer's order at FS
  - Sales call: salesperson either telephones the customer or visits in person
  - At the end of sales call, salesperson prepares a handwritten quotation on a form that generates two copies
    - Original sheet goes to the customer
    - Middle copy is first faxed and then mailed to the sales office
    - Salesperson keeps the bottom copy for his or her records

# Sales Quotations and Orders (cont'd.)

- Giving a customer a price quotation and then taking the customer's order at FS (cont'd.)
  - Quotation form has an 800 number that the customer can call to place an order
- Problems can occur with this process
- Inefficiencies in the rest of the ordering process
  - Determining the delivery date
  - Checking customer's credit status
  - Entering customer's order into the current order entry system

# Order Filling

- Packing lists and shipping labels
  - Printed twice a day
  - Hand-carried to the warehouse
  - At warehouse, hand-sorted into small orders and large orders
- Warehouse
  - Small-order packing area
  - Large-order packing area
- FS uses a PC database program to manage inventory levels in the warehouse

# Order Filling (cont'd.)

- FS keeps inventory levels fairly low, and inventory levels change rapidly during the day
  - Picker might go to the shelves to pick an order and discover that there are not enough of the desired type of snack bars to fill the order
  - To determine what to do in this situation, order picker might have conversations with warehouse supervisor, production supervisor, and sales clerks

# Accounting and Invoicing

- Invoicing the customer is problematic
- Sales clerks send the Accounting department the sales order data for customer invoices
- Accounting department loads the data into PC-based accounting program
- Clerks manually make adjustments for partial shipments and any other changes
- Sometimes, order corrections are delayed and don't catch up to the invoicing process
  - Results in late or inaccurate invoices

# Payment and Returns

- Problems with procedure for processing payments
  - If any errors have occurred in the sales process, customer will receive an incorrect invoice
  - Many customers don't return a copy of the invoice with their payment; errors can result

# Payment and Returns (cont'd.)

- FS's returns processing is flawed
  - Many customers do not call for the RMA number, or fail to include it with their returned material
    - Makes it more difficult for Accounting department to credit the appropriate account
  - Poor penmanship on the returned material sheet can create problems for Accounting
- If a customer's account has not been properly credited, customer may receive a dunning letter in error

# Sales and Distribution in ERP

- ERP systems can minimize data entry errors and provide accurate information in real time to all users
- ERP systems can track all transactions (such as invoices, packing lists, RMA numbers, and payments) involved in the sales order

# Sales and Distribution in ERP (cont'd.)

- SAP ERP Sales and Distribution module treats the sales order process as a cycle of events:
  - Pre-sales activities
  - Sales order processing
  - Inventory sourcing
  - Delivery
  - Billing
  - Payment

# Pre-Sales Activities

- Customers can get pricing information about the company's products:
  - Through an inquiry or a price quotation
- Marketing activities such as tracking customer contacts, including sales calls, visits, and mailings
- Company can maintain data about customers and generate mailing lists based on specific customer characteristics

# Sales Order Processing

- Sales order processing: series of activities that must take place to record a sales order
- Sales order can start from a quotation or inquiry generated in the pre-sales step
- Information collected from the customer to support the quotation is immediately included in sales order
- Critical steps in sales order processing:
  - Recording the items to be purchased
  - Determining the selling price
  - Recording the order quantities

# Sales Order Processing (cont'd.)

- Users can define various pricing alternatives in the SAP ERP system
- SAP ERP system checks the Accounts Receivable tables in the SAP ERP database to confirm the customer's available credit
- If customer has sufficient credit available
  - Order is completed
- If customer does not have sufficient credit available
  - SAP ERP system prompts sales personnel to take one of the possible appropriate actions

# Inventory Sourcing

- Available-to-Promise (ATP) check
  - SAP ERP system checks company's inventory records and production planning records to see whether:
    - Requested material is available
    - Requested material can be delivered on the date the customer desires
  - Includes expected shipping time
- System can recommend an increase in planned production if a shortfall is expected

# Delivery

- **Delivery** in SAP ERP system
  - Releasing the documents that the warehouse uses to pick, pack, and ship orders
- Delivery process allows deliveries to be created so that the warehouse and shipping activities are carried out efficiently
- Once the system has created documents for picking, packing, and shipping, documents are transferred to Materials Management module

# Billing

- SAP ERP system creates an invoice by copying sales order data into the invoice document
- Accounting can print this document and mail it, fax it, or transmit it electronically to the customer
- Accounting records are updated at this point

# Payment

- When the customer sends in a payment, it is automatically processed by the SAP ERP system
  - Debits cash and credits (reduces) customer's account
- Timely recording of this transaction has an effect on the timeliness and accuracy of any subsequent credit checks for the customer

# A Standard Order in SAP ERP

- How Fitter Snacker's sales order process would work with an SAP ERP system in place
- How the ERP system would make FS's sales order process more accurate and efficient
- ERP allows business processes to cut across functional area lines

# Taking an Order in SAP ERP

- Order entry screen in SAP ERP's 4.7 Enterprise system
- A unique number is assigned by the company to each customer in the database
- For most data entry fields, SAP ERP system determines whether an entry is valid
- Search screen for customers

# Taking an Order in SAP ERP (cont'd.)

Sold-To Party: Where the customer's identification number is entered

PO Number: The number assigned by the customer to this sales order

Req. deliv. date: The date when the customer would like to receive the order

Material and Order Quantity: What the customer is ordering

All Items	Item	Material	Order Quantity	Unit	Description	Customer Material Numbr	ItCa	DG...	H...

Figure 3-2 SAP ERP order entry screen

# Taking an Order in SAP ERP (cont'd.)

Data entry field	Explanation
Sold-To Party	Identification number assigned to customer
PO Number	The number assigned by the customer to the sales transaction; this is different from the sales order number assigned by the seller (using SAP ERP) to the sales transaction. In a paper process, the purchase order number is usually a sequential number preprinted on the purchase order form
Req. deliv. date	The delivery date for the order requested by the customer; the SAP ERP system will evaluate the ability to meet this date and suggest alternatives, if necessary
Material	The identification number assigned in the SAP ERP system to the item requested by the customer
Order Quantity	The number of units of the material the customer is requesting

Figure 3-3 Data entry fields in the order entry screen

# Taking an Order in SAP ERP (cont'd.)

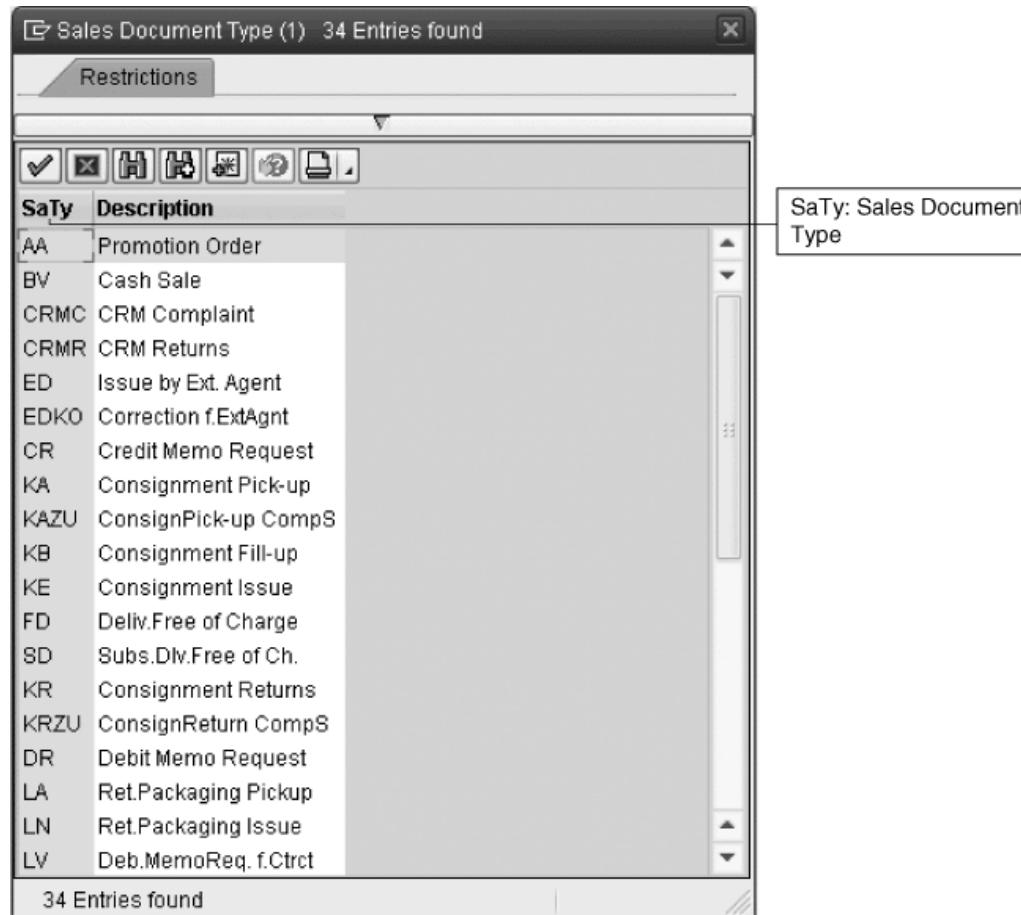


Figure 3-4 Some of the sales order document types predefined in SAP ERP

# Taking an Order in SAP ERP (cont'd.)

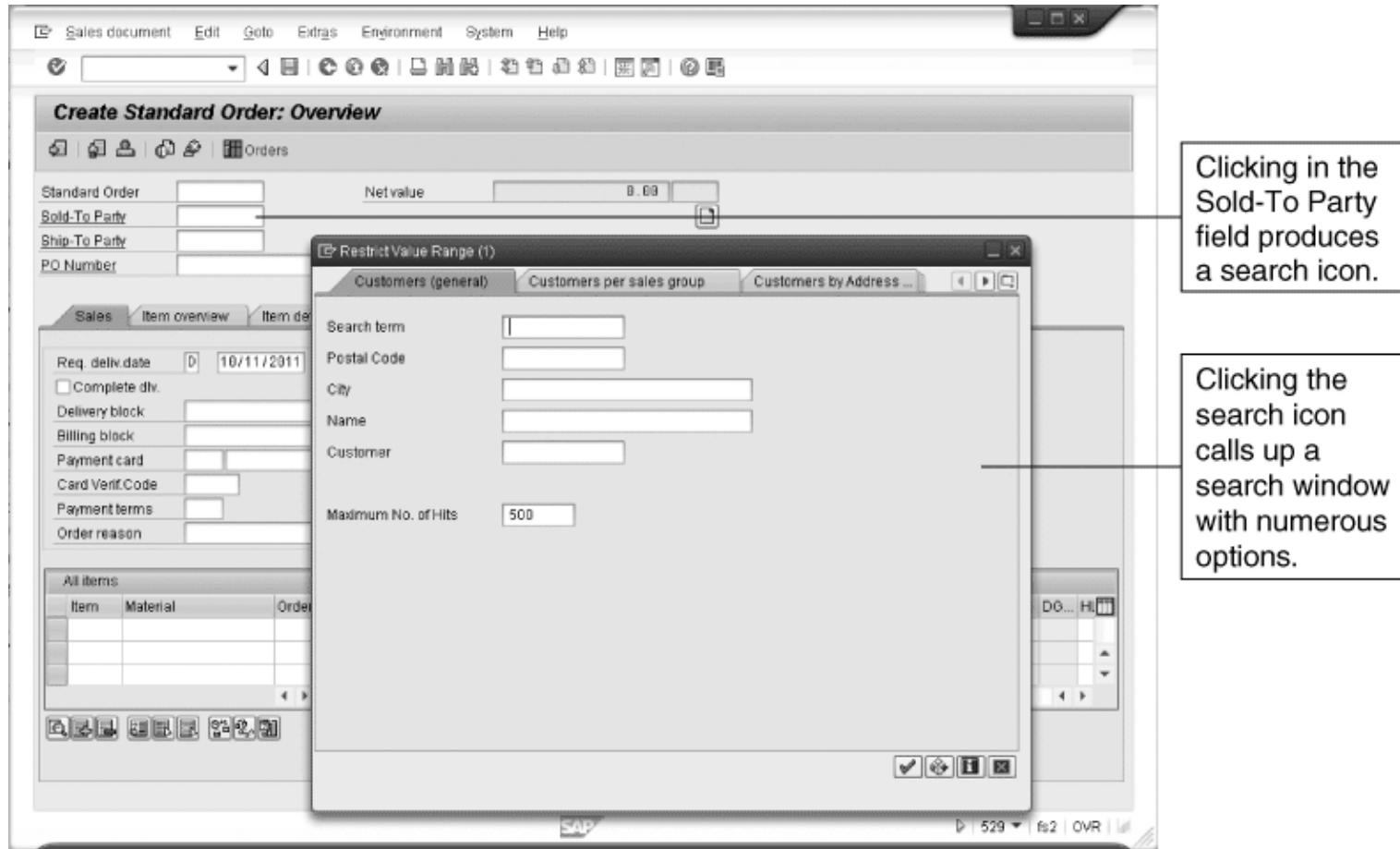


Figure 3-5 Search screen for customers

# Taking an Order in SAP ERP (cont'd.)

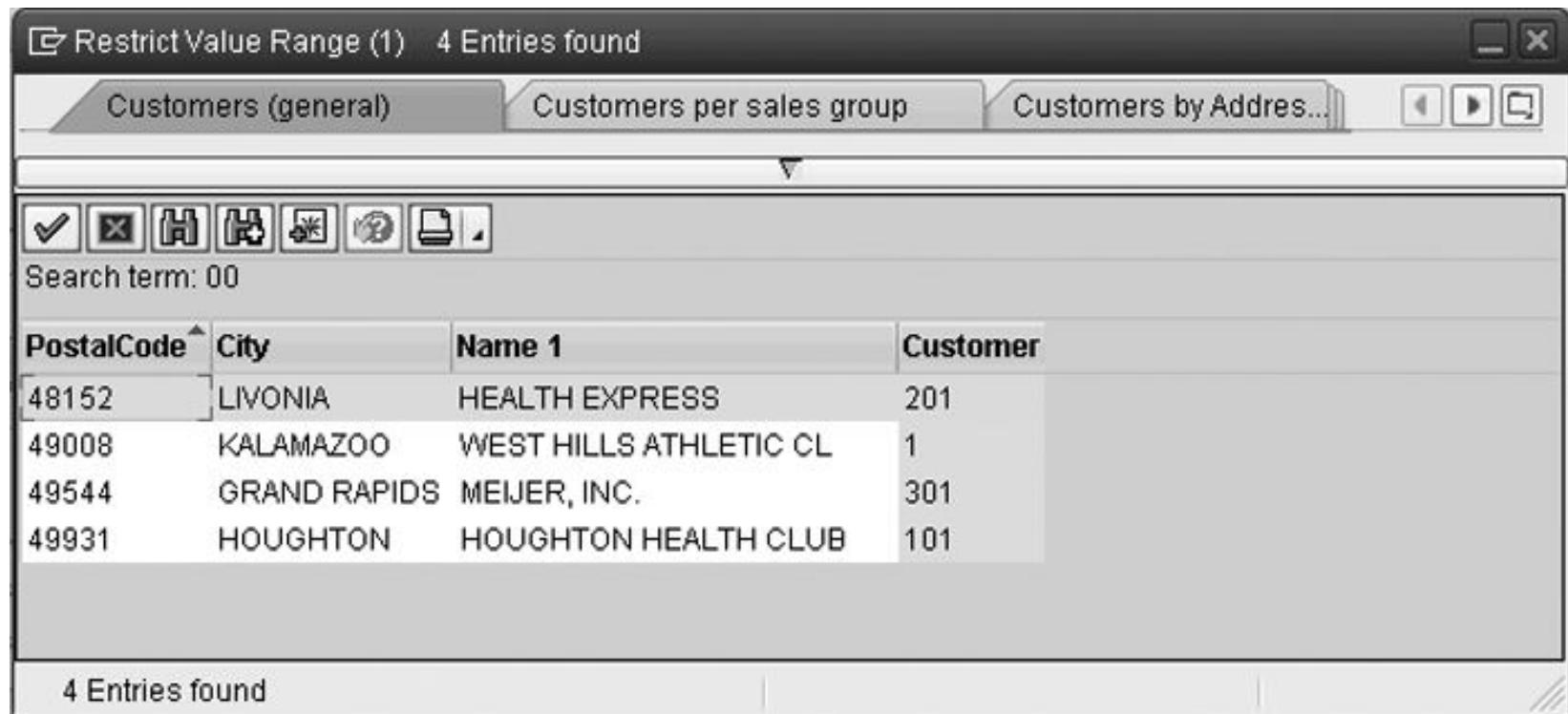


Figure 3-6 Result of customer search

# Taking an Order in SAP ERP (cont'd.)

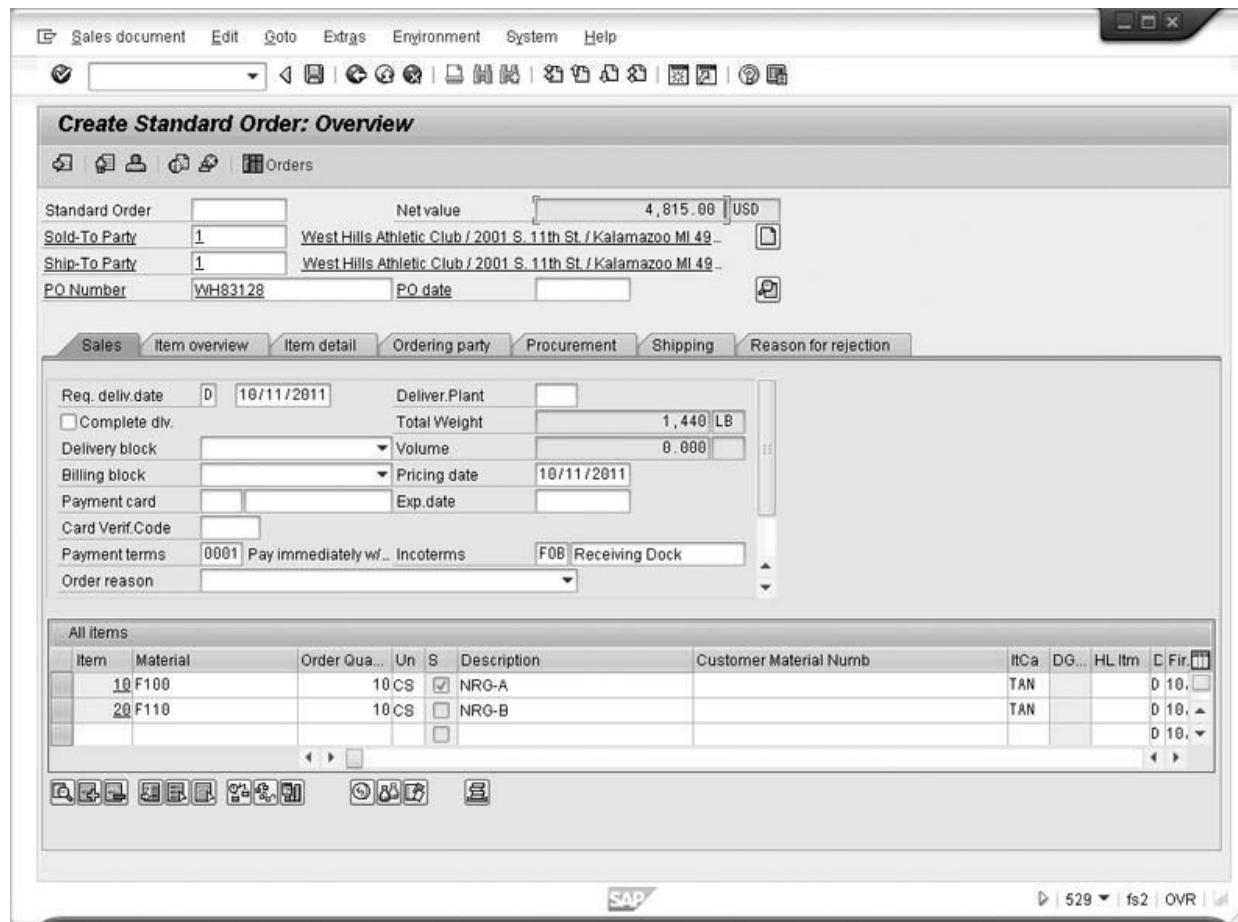


Figure 3-7 Order screen with complete date

# Taking an Order in SAP ERP (cont'd.)

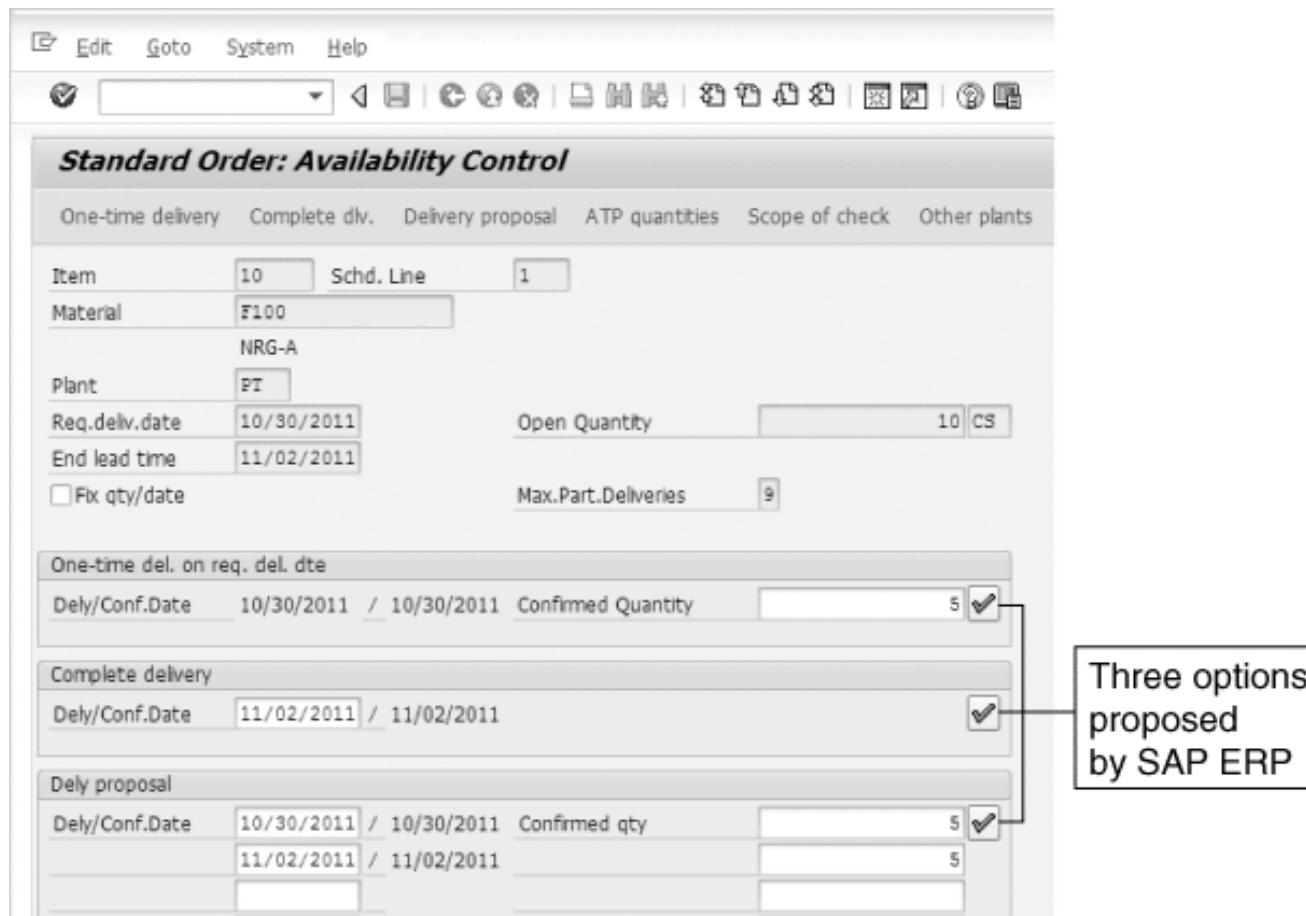


Figure 3-8 Order proposals

# Taking an Order in SAP ERP (cont'd.)

- **Customer master data**
- Master data: data that remain fairly stable
  - Maintained in the central database and available to all SAP ERP modules
- **Material master data**
- **Organizational structures**
  - SAP ERP system allows the user to define various ways to group customers and salespeople
  - Distribution Channel

# Taking an Order in SAP ERP (cont'd.)

- When a sales order is saved, SAP ERP system assigns a document number to the sales order transaction
- SAP ERP system keeps track of the document numbers for the sales order
  - Employees can track status of an order while it is in process or research it after shipping
- **Document flow** in SAP ERP: linked set of document numbers related to an order

# Taking an Order in SAP ERP (cont'd.)

The screenshot shows the SAP Document Flow interface. At the top, there's a toolbar with various icons and a menu bar with options like Document flow, Edit, Goto, Environment, System, and Help. Below the toolbar, there's a navigation bar with links for Status overview, Display document, and Service documents. The main area is titled "Document Flow". It displays a table of documents with columns for Document, Quantity, Unit, Ref.value, Currency, On, and Status. The table shows the following hierarchy:

Document	Quantity	Unit	Ref.value	Currency	On	Status
Standard Order 000000005 / 10	10	CS	2,160.00	USD	10/11/2011	Completed
Outbound Delivery 008000003 / 10	10	CS			10/11/2011	Completed
Picking request 2011011 / 10	10	CS			10/11/2011	Completed
GD goods issue:delv 490000003 / 1	10	CS	168.00	USD	10/11/2011	complete
Invoice 009000002 / 10	10	CS	2,160.00		10/11/2011	FI doc. generated
Accounting document 009000002	10	CS			10/11/2011	Cleared

A callout box on the right side of the screenshot contains the text: "accounting document 90000002 is linked to sales order 5".

Figure 3-9 The Document Flow tool, which links sales order documents

# Discount Pricing in SAP ERP

- When a company installs an ERP system, it can configure it for a number of pricing strategies
- Various kinds of discounts can be allowed
- As a safeguard, system can enforce limits on the size of discounts
- **Condition technique**
  - Control mechanism developed by SAP to accommodate various ways that companies offer price discounts

# Discount Pricing in SAP ERP (cont'd.)

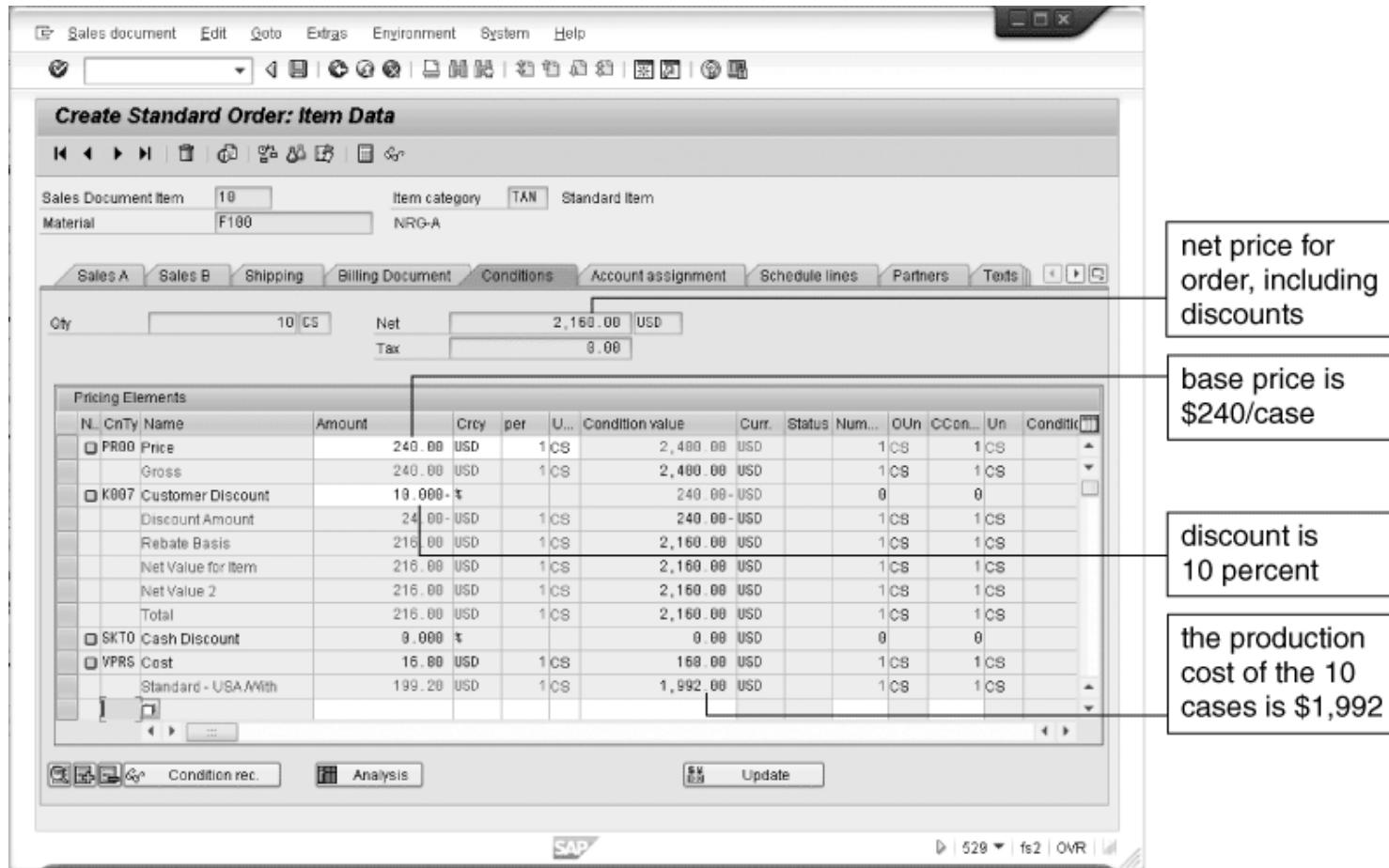


Figure 3-10 Pricing conditions for sales order

# Integration of Sales and Accounting (cont'd.)

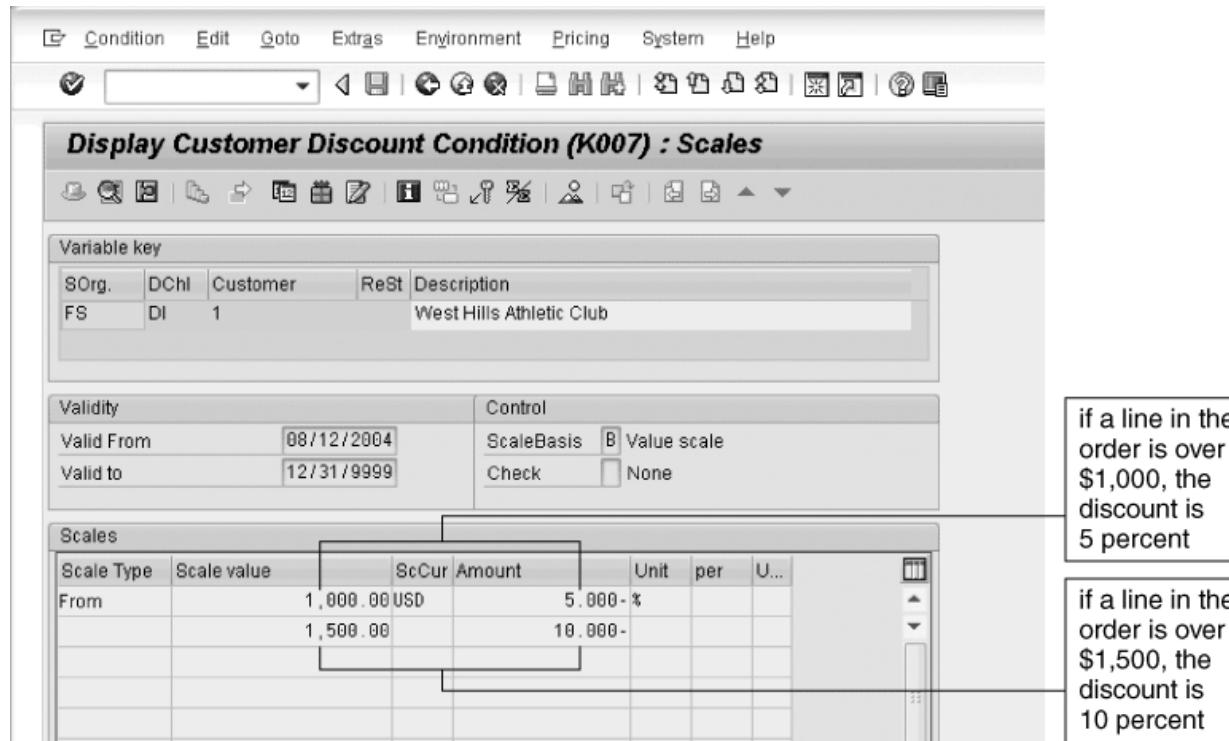


Figure 3-11 West Hills Athletic Club price Discount

# Integration of Sales and Accounting

- ERP systems integrate Accounting with all business processes
- When a sales order is recorded, related accounting data are updated automatically

# Integration of Sales and Accounting (cont'd.)

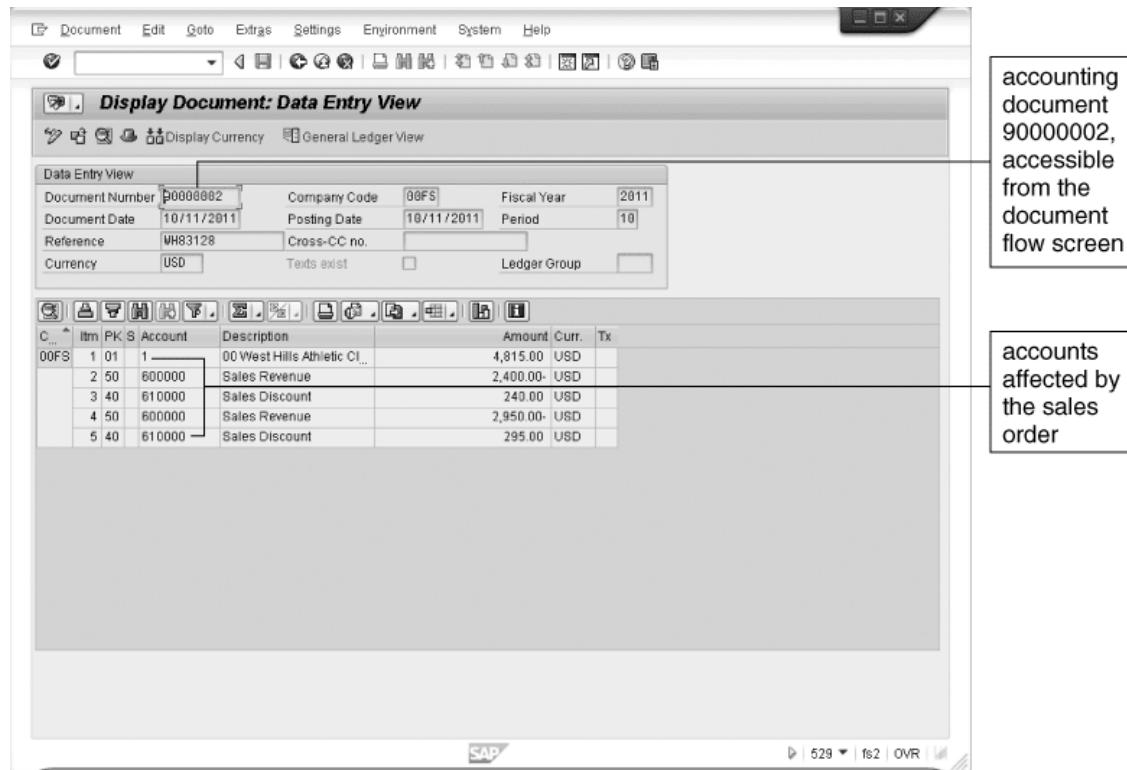


Figure 3-12 Accounting detail for the West Hills sales order

# Customer Relationship Management

- Companies without a good connection between their workers and their customers run the risk of losing business
- **Customer relationship management (CRM) software** can help companies streamline their interactions with customers
- **On-demand CRM:** software and computer equipment reside with CRM provider

# Core CRM Activities

- One-to-one marketing
- Sales force automation (SFA)
- Sales campaign management
- Marketing encyclopedias
- Call center automation

# SAP's CRM Software

- Examples of tools that provide CRM functionality within the SAP ERP system
  - Contact management tool
    - To make sure that information about sales contacts is available throughout the organization
  - Sales activity manager
    - Supports a strategic and organized approach to sales activity planning and can help make sure that follow-up activities are accomplished
- Employing a separate CRM system that communicates with the ERP system

# SAP's CRM Software

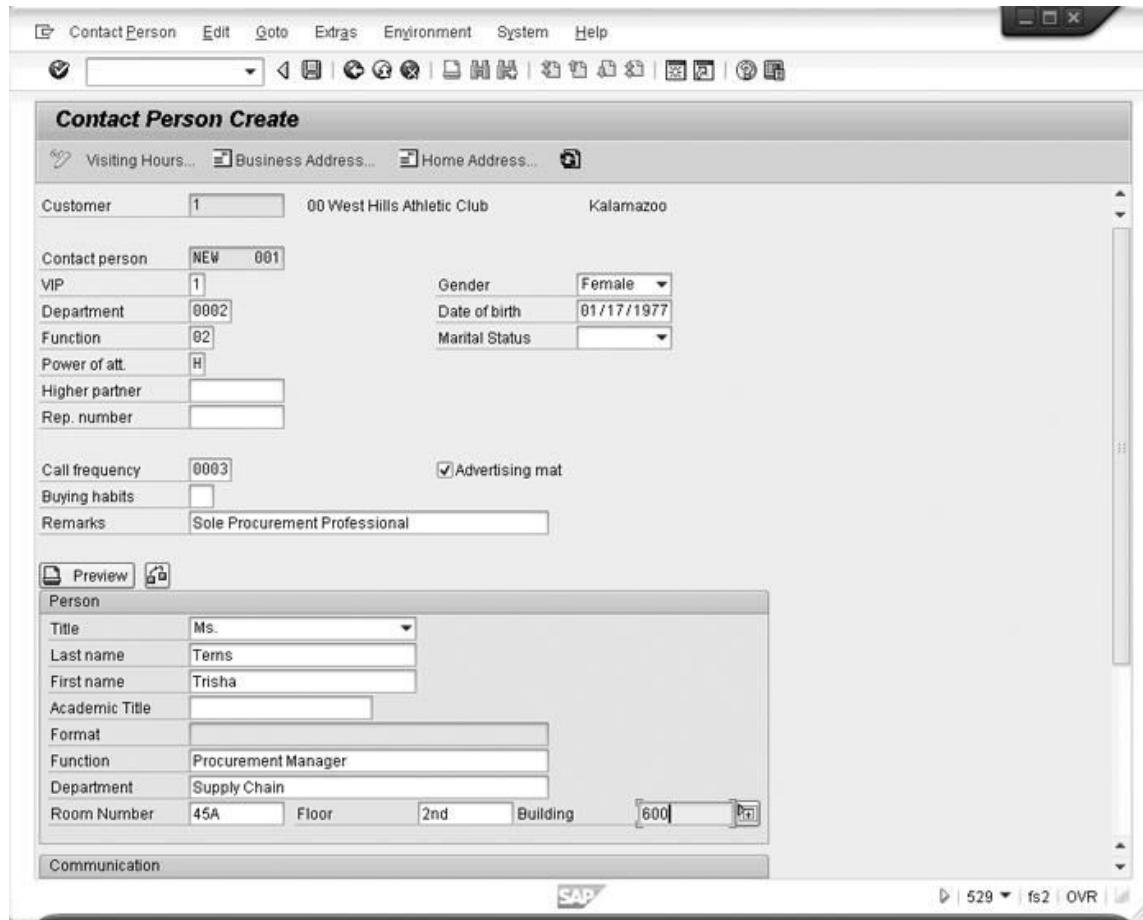


Figure 3-13 SAP ERP contact manager

# SAP's CRM Software

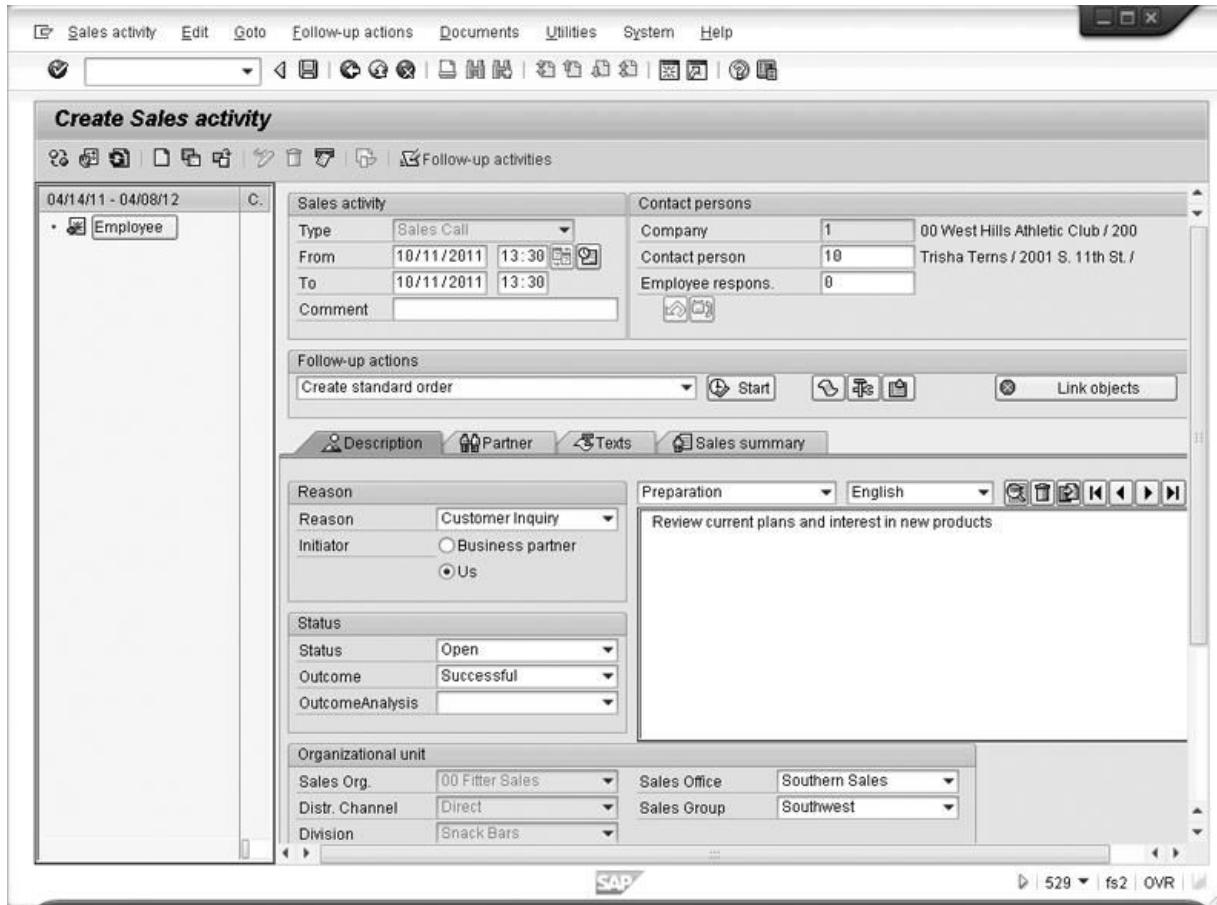


Figure 3-14 SAP ERP sales activity manager

# SAP's CRM Software (cont'd.)

- SAP ERP system processes business transactions and provides much of the raw data for CRM
- SAP's Business Warehouse: system for reporting and analysis of transactional data
- Advanced Planner and Optimizer (APO): system that supports efficient planning of the supply chain
- SAP's view of CRM is to provide a set of tools to manage the three basic task areas, or jobs:
  - Marketing, sales, and service

# SAP's CRM Software (cont'd.)

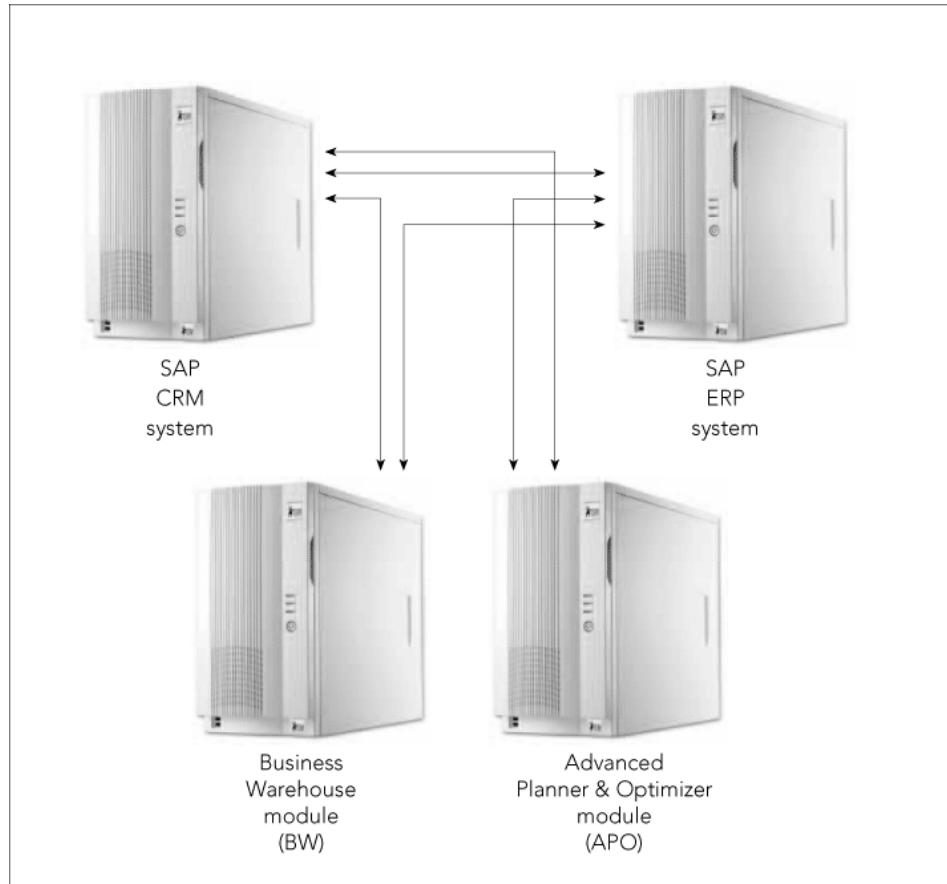


Figure 3-15 SAP CRM system landscape

# SAP's CRM Software (cont'd.)

- Four phases of the cultivation of customer relationship:
  - Prospecting
  - Acquiring
  - Servicing
  - Retaining
- Contact Channels
- Marketing and Campaign Management
- Campaign Execution Activity Management
- Campaign Analysis tool

# SAP's CRM Software (cont'd.)

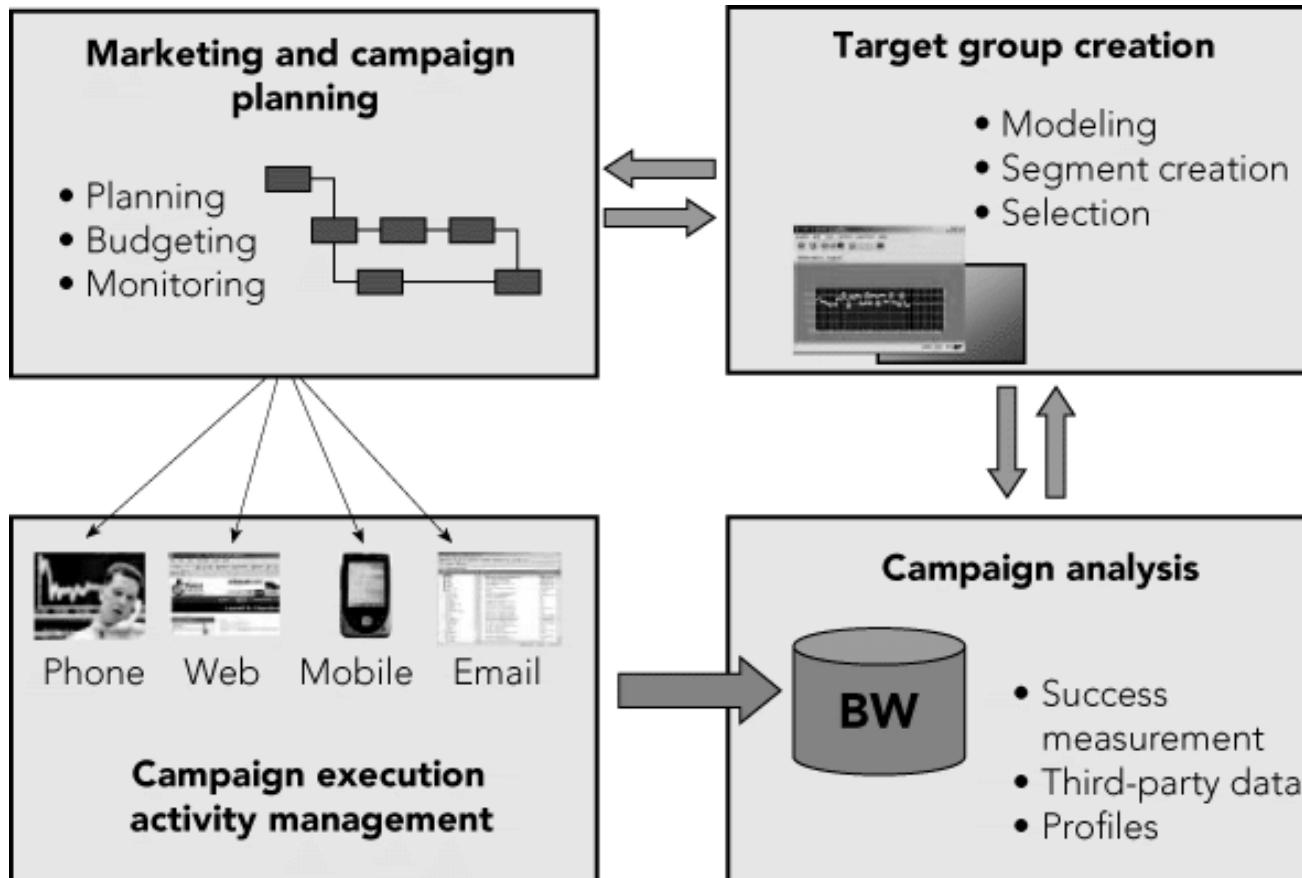


Figure 3-16 Marketing and campaign planning

# The Benefits of CRM

- Lower costs
- Higher revenue
- Improved strategy and performance measurement

# Summary

- Fitter Snacker's unintegrated information systems are at the root of an inefficient and costly sales order process
- An ERP system such as SAP ERP treats a sale as a sequence of related functions
  - Including: taking orders, setting prices, checking product availability, checking the customer's credit line, arranging for delivery, billing the customer, and collecting payment
  - In SAP ERP, all these transactions, or documents, are electronically linked

# Summary (cont'd.)

- Installing an ERP system means making various configuration decisions
  - Configuration decisions reflect management's view of how transactions should be recorded and later used for decision making
- ERP system's central database contains:
  - Tables of master data: relatively permanent data about customers, suppliers, material, and inventory
  - Transaction data tables: store relatively temporary data such as sales orders and invoices

# Summary (cont'd.)

- Customer relationship management (CRM) systems
  - Build on the organizational value that ERP provides
  - Specifically increase the flexibility of the company's common database regarding customer service
  - Various kinds of CRM software are available
  - Can be installed in-house or on-demand



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Four*

*Production and Supply Chain  
Management Information Systems*

# Policies for students

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# Objectives

After completing this chapter, you will be able to:

- Describe the steps in the production planning process of a high-volume manufacturer such as Fitter Snacker
- Describe Fitter Snacker's production and materials management problems
- Describe how a structured process for Supply Chain Management planning enhances efficiency and decision making
- Describe how production planning data in an ERP system can be shared with suppliers to increase supply chain efficiency

# Introduction

- Supply Chain Management (SCM) in an ERP system
- Fitter Snacker is part of a supply chain
- FS's SCM problems and how ERP can help fix them

# Production Overview

- To meet customer demand efficiently, Fitter Snacker must:
  - Develop a forecast of customer demand
  - Develop a production schedule to meet the estimated demand
- ERP system is a good tool for developing and executing production plans
- Goal of production planning is to schedule production economically

# Production Overview (cont'd.)

- Three general approaches to production
  - *Make-to-stock* items: made for inventory (the “stock”) in anticipation of sales orders
  - *Make-to-order* items: produced to fill specific customer orders
  - *Assemble-to-order* items: produced using a combination of make-to-stock and make-to-order processes

# Fitter Snacker's Manufacturing Process

- Fitter Snacker uses make-to-stock production

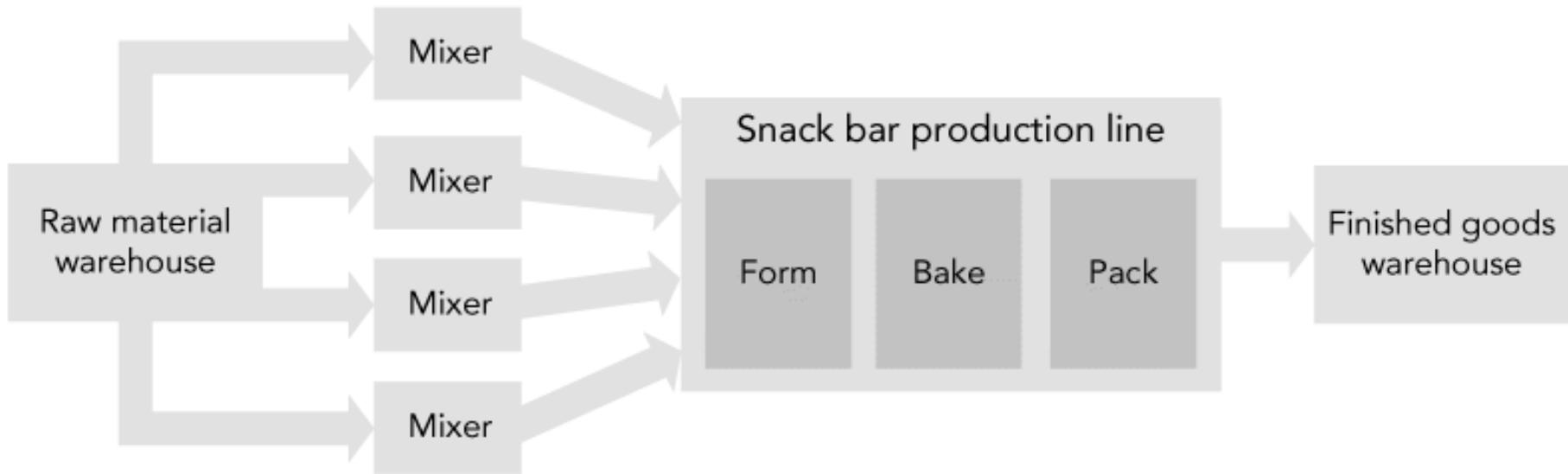


Figure 4-1 Fitter Snacker's manufacturing process

# Fitter Snacker's Manufacturing Process (cont'd.)

- Snack bar line can produce 200 bars a minute, or 12,000 bars per hour
- Each bar weighs four ounces
- Product 48,000 ounces/hour, or 3,000 lbs/hour
- Entire production line operates on one shift a day
- Fitter Snacker's production sequence
  - **Capacity:** number of bars that can be produced

# Fitter Snacker's Production Problems

- Fitter Snacker has problems deciding *how many* bars to make and *when* to make them
- Communication problems
  - FS's Marketing and Sales personnel do not share information with Production personnel
  - Production personnel find it hard to deal with sudden increases in demand
    - Might cause shortages or stockout

# Fitter Snacker's Production Problems (cont'd.)

- Inventory problems
  - Production manager lacks systematic method for:
    - Meeting anticipated sales demand
    - Adjusting production to reflect actual sales
- Accounting and purchasing problems
  - **Standard costs:** normal costs of manufacturing a product
  - Production and Accounting must periodically compare standard costs with actual costs and then adjust the accounts for the inevitable differences

# The Production Planning Process

- Three important principles for production planning:
  - Work from sales forecast and current inventory levels to create an “aggregate” (“combined”) production plan for all products
  - Break down aggregate plan into more specific production plans for individual products and smaller time intervals
  - Use production plan to determine raw material requirements

# The SAP ERP Approach to Production Planning

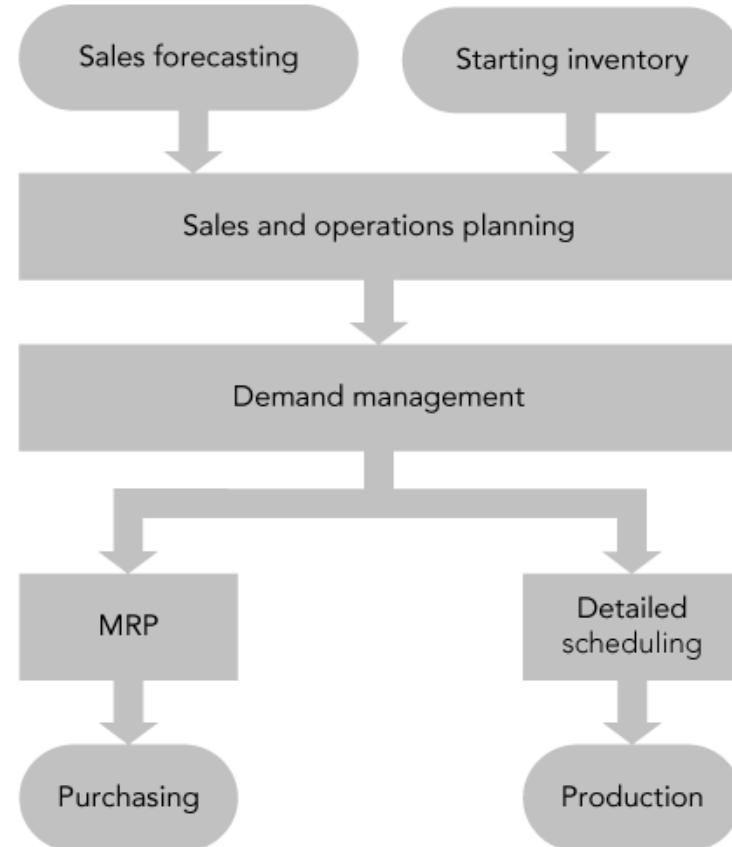


Figure 4-2 The production planning process

# Sales Forecasting

- SAP's ERP system takes an integrated approach
  - Whenever a sale is recorded in Sales and Distribution (SD) module, quantity sold is recorded as a consumption value for that material
- Simple forecasting technique
  - Use a prior period's sales and then adjust those figures for current conditions
- To make a forecast for Fitter Snacker:
  - Use previous year's sales data in combination with marketing initiatives to increase sales

# Sales Forecasting (cont'd.)

Sales forecasting	Jan.	Feb.	March	April	May	June
Previous year (cases)	5734	5823	5884	6134	6587	6735
Promotion sales (cases)					300	300
Previous year base (cases)	5734	5823	5884	6134	6287	6435
Growth: 3.0%	172	175	177	184	189	193
Base projection (cases)	5906	5998	6061	6318	6476	6628
Promotion (cases)						500
Sales forecast (cases)	5906	5998	6061	6318	6476	7128

Figure 4-3 Fitter Snacker's sales forecast for January through June

# Sales and Operations Planning

- Sales and operations planning (SOP)
  - Input: sales forecast provided by Marketing
  - Output: production plan designed to balance market demand with production capacity
    - Production plan is the input to the next step, demand management

# Sales and Operations Planning (cont'd.)

Sales and operations planning		Dec.	Jan.	Feb.	March	April	May	June
1) Sales forecast			5906	5998	6061	6318	6476	7128
2) Production plan			5906	5998	6061	6318	6650	6950
3) Inventory		100	100	100	100	100	274	96
4) Working days			21	20	23	21	21	22
5) Capacity (shipping cases)			6999	6666	7666	6999	6999	7333
6) Utilization			84%	90%	79%	90%	95%	95%
7) NRG-A (cases)	70.0%		4134	4199	4243	4423	4655	4865
8) NRG-B (cases)	30.0%		1772	1799	1818	1895	1995	2085

Figure 4-5 Fitter Snacker's sales and operations plan for January through June

# Sales and Operations Planning (cont'd.)

- In SAP ERP, sales forecast can be made using:
  - Historical sales data from the Sales and Distribution (SD) module
  - Input from plans developed in Controlling (CO) module
- CO module
  - Profit goals for company can be set
  - Sales levels needed to meet the profit goals can be estimated

# Sales and Operations Planning (cont'd.)

- **Rough-cut planning:** common term in manufacturing for aggregate planning
  - Disaggregated to generate detailed production schedules
- Once SAP ERP system generates a forecast, the planner can view the results graphically
- Rough-cut capacity planning applies simple capacity-estimating techniques to the production plan to see if the techniques are feasible

# Sales and Operations Planning (cont'd.)

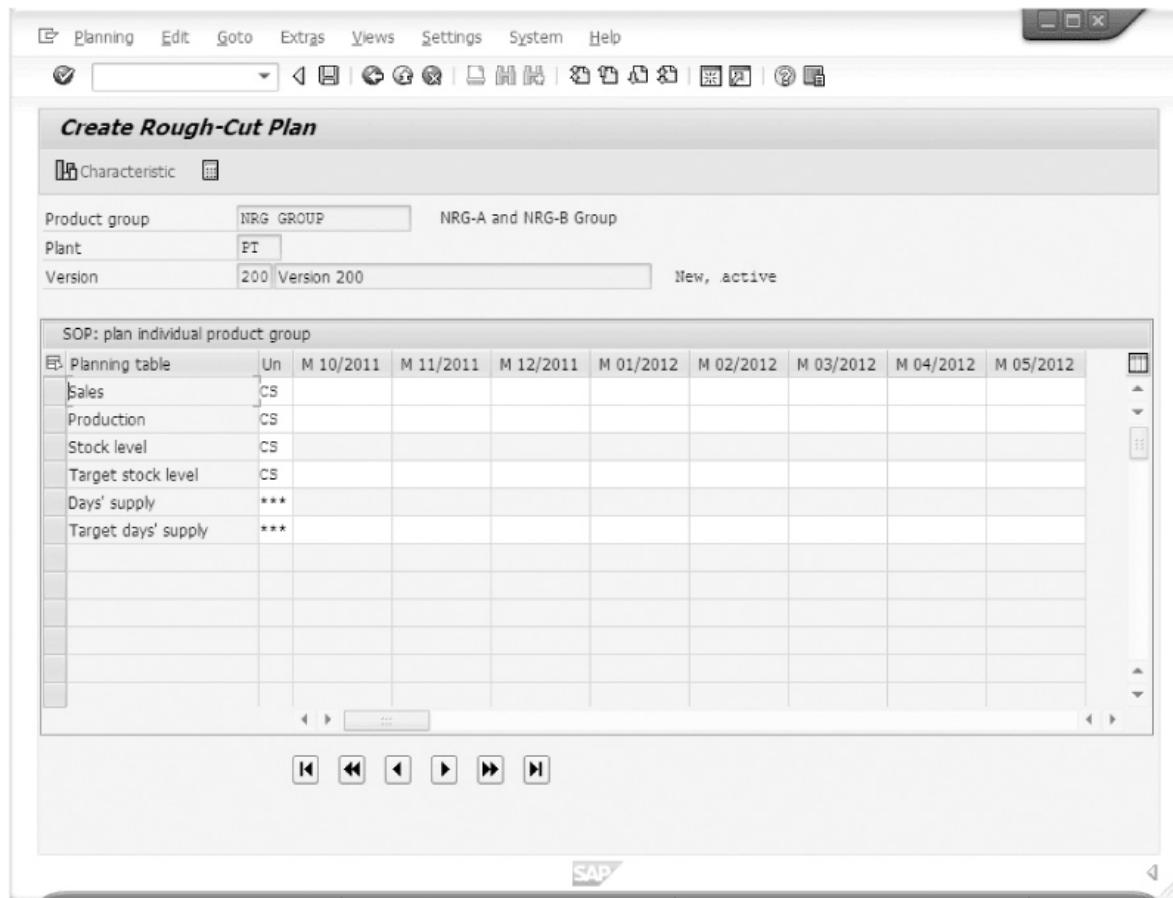


Figure 4-6 Sales and operations planning screen in SAP ERP

**Forecast: Historical Values**

Sales provided from SD module

Historical values

Period	Val. fld	Corr.value	F	C
M 09/2011	6214	6214	<input type="checkbox"/>	<input type="checkbox"/>
M 08/2011	6326	6326	<input type="checkbox"/>	<input type="checkbox"/>
M 07/2011	6501	6501	<input type="checkbox"/>	<input type="checkbox"/>
M 06/2011	6434	6434	<input type="checkbox"/>	<input type="checkbox"/>
M 05/2011	6286	6286	<input type="checkbox"/>	<input type="checkbox"/>
M 04/2011	6133	6133	<input type="checkbox"/>	<input type="checkbox"/>
M 03/2011	5883	5883	<input type="checkbox"/>	<input type="checkbox"/>
M 02/2011	5822	5822	<input type="checkbox"/>	<input type="checkbox"/>

Field where planner can "correct" the sales value

Forecasting    Correct   

Period	Val. fld	Corr.value	F	C
M 09/2011	6214	6214	<input type="checkbox"/>	<input type="checkbox"/>
M 08/2011	6326	6326	<input type="checkbox"/>	<input type="checkbox"/>
M 07/2011	6501	6501	<input type="checkbox"/>	<input type="checkbox"/>
M 06/2011	6434	6434	<input type="checkbox"/>	<input type="checkbox"/>
M 05/2011	6286	6286	<input type="checkbox"/>	<input type="checkbox"/>
M 04/2011	6133	6133	<input type="checkbox"/>	<input type="checkbox"/>
M 03/2011	5883	5883	<input type="checkbox"/>	<input type="checkbox"/>
M 02/2011	5822	5822	<input type="checkbox"/>	<input type="checkbox"/>

Figure 4-7 Historical sales figures in SAP

# Sales and Operations Planning (cont'd.)

- Historical sales screen allow planner to correct sales values
- Do not account for external factors, such as unusual weather
- Sales figures forecasting represent best estimate of demand

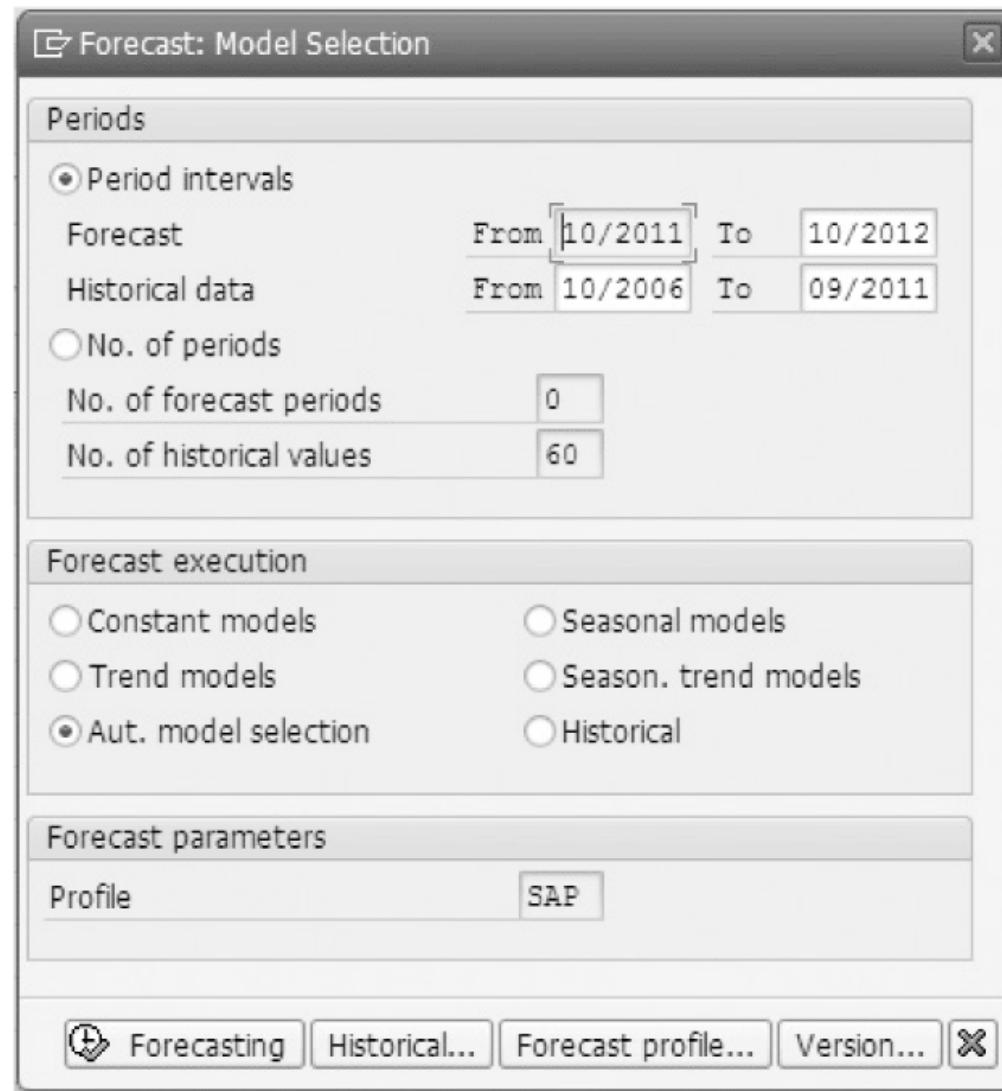


Figure 4-8 Forecasting model options in SAP ERP

# Sales and Operations Planning (cont'd.)

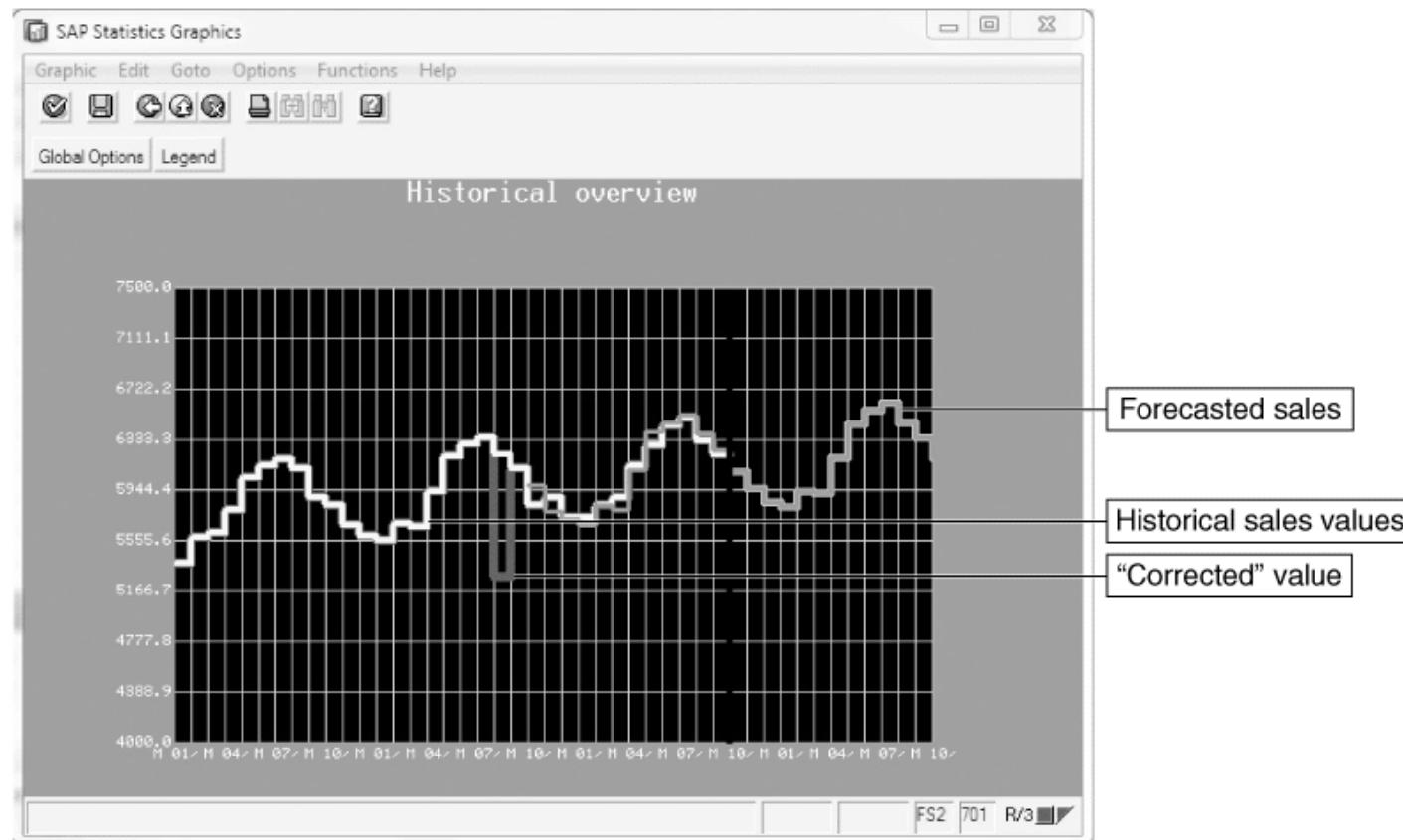


Figure 4-9 Forecasting results presented graphically in SAP ERP

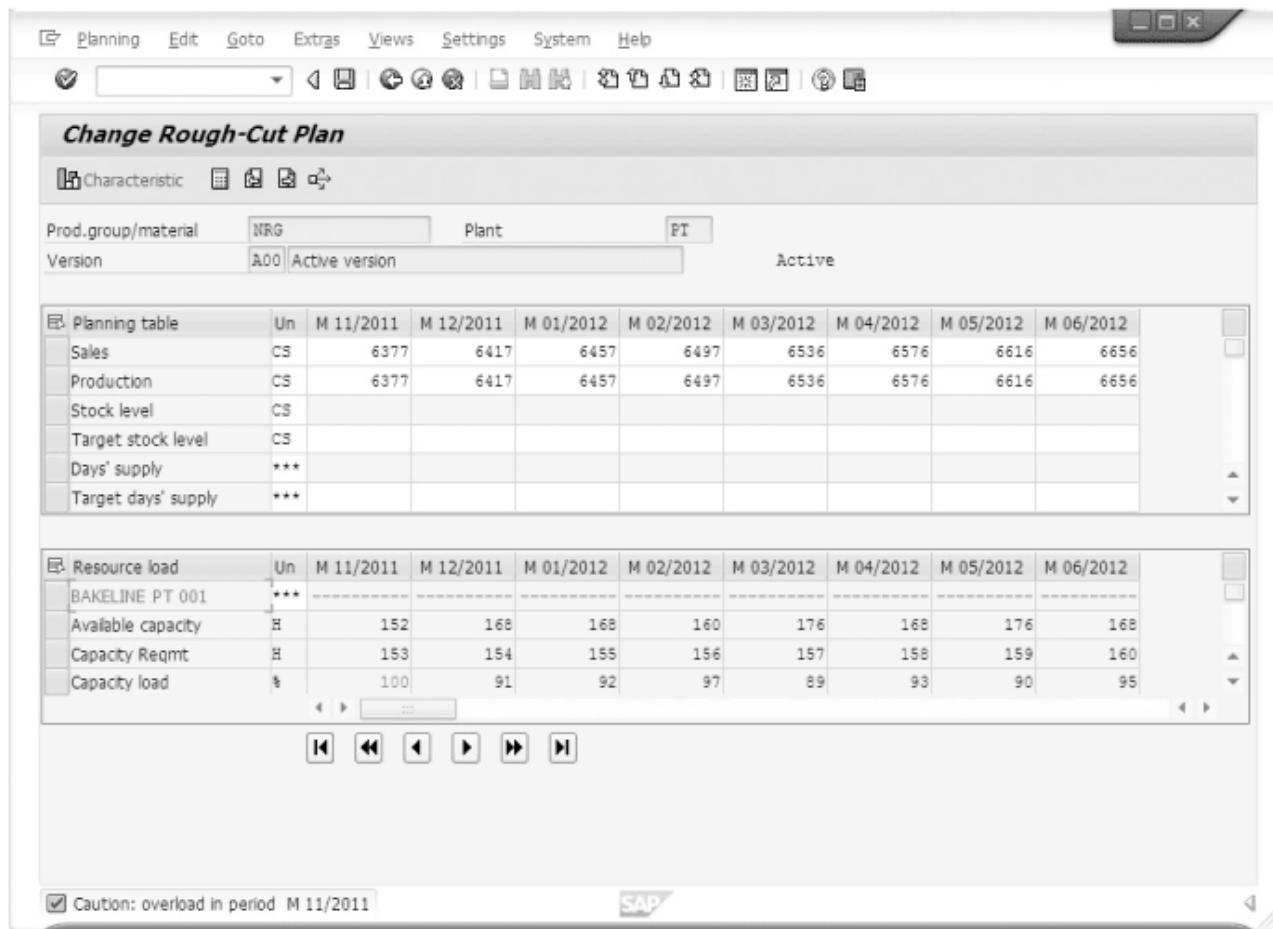


Figure 4.10 Sales and operation plan with rough-cut capacity calculation in SAP ERP

# Sales and Operations Planning (cont'd.)

- Disaggregating the sales and operations plan
  - Companies typically develop sales and operations plans for product groups
  - SAP ERP system allows any number of products to be assigned to a product group
  - Sales and operation plan disaggregated
    - Production plan quantities specified for the group are transferred to the individual products that make up the group

# Sales and Operations Planning (cont'd.)

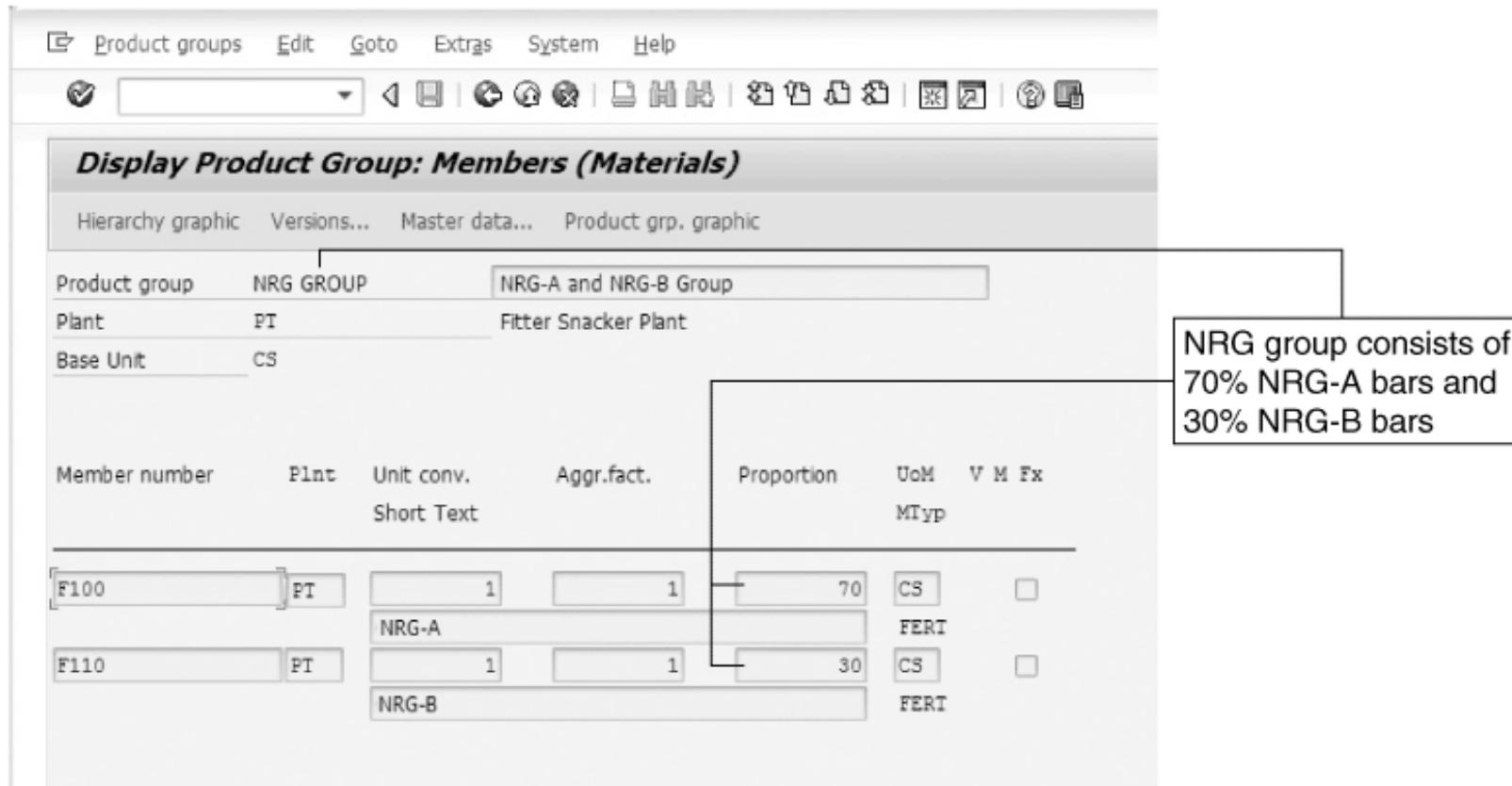


Figure 4-11 Product group structure in SAP ERP

# Sales and Operations Planning (cont'd.)

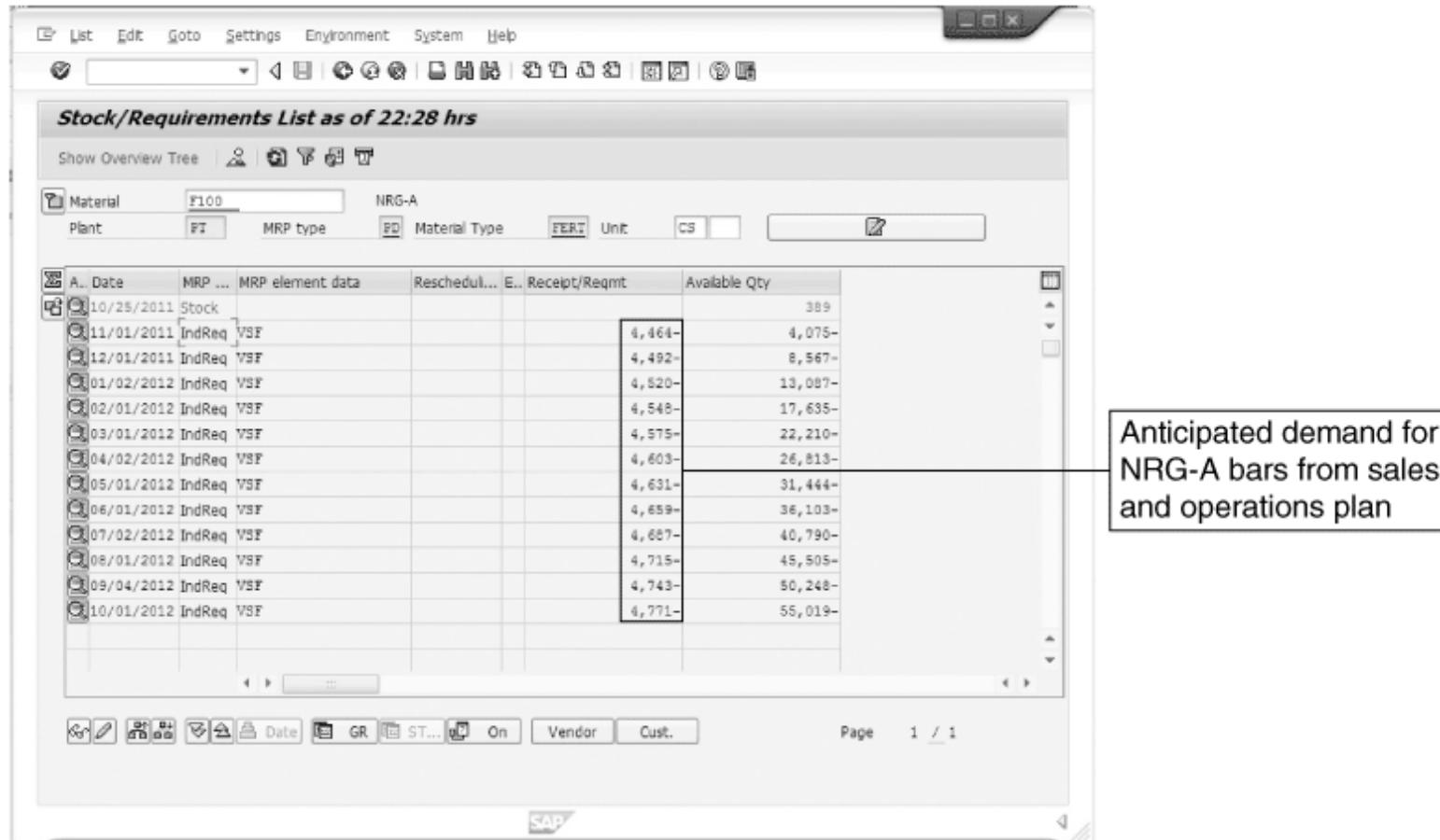


Figure 4-12 Stock/Requirements List for NRG-A bars after disaggregation

# Demand Management

- Links the sales and operations planning process with detailed scheduling and materials requirements planning processes
- Output: **master production schedule (MPS)**
  - Production plan for all finished goods
- For Fitter Snacker, MPS is an input to detailed scheduling, which determines what bars to make and when to make them

# Demand Management (cont'd.)

	<b>Week 1</b>	<b>Week 2</b>	<b>Week 3</b>	<b>Week 4</b>	<b>Week 5</b>	
<b>Demand management</b>	1/3–1/7	1/10–1/14	1/17–1/21	1/24–1/28	1/31	2/1–2/4
<b>Monthly demand</b>	NRG-A	4134	4134	4134	4134	4199
	NRG-B	1772	1772	1772	1772	1799
<b>Working days in week</b>		5	5	5	1	4
<b>Working days in month</b>		21	21	21	21	20
<b>MPS</b>	NRG-A	984	984	984	984	1037
<b>Weekly demand</b>	NRG-B	422	422	422	422	444

<b>Demand management</b>	Jan 3	Jan 4	Jan 5	Jan 6	Jan 7
<b>Monthly Demand</b>	NRG-A	4134	4134	4134	4134
	NRG-B	1772	1772	1772	1772
<b>Working days in month</b>		21	21	21	21
<b>MPS</b>	NRG-A	197	197	197	197
<b>Daily demand</b>	NRG-B	84	84	84	84

Figure 4-14 Fitter Snacker's production plan for January: The first five weeks of production are followed by a day-by-day disaggregation of week 1

# Materials Requirements Planning (MRP)

- Determines required quantity and timing of the production or purchase of subassemblies and raw materials needed to support MPS
- **Bill of material (BOM):** list of the materials (including quantities) needed to make a product

Ingredient	Quantity	
	NRG-A	NRG-B
Oats (lb.)	300	250
Wheat germ (lb.)	50	50
Cinnamon (lb.)	5	5
Nutmeg (lb.)	2	2
Cloves (lb.)	1	1
Honey (gal.)	10	10
Canola oil (gal.)	7	7
Vit./min. powder (lb.)	5	5
Carob chips (lb.)	50	
Raisins (lb.)	50	
Protein powder (lb.)		50
Hazelnuts (lb.)		30
Dates (lb.)		70

Figure 4-15 Fitter's factory calendar for August

# Materials Requirements Planning (MRP) (cont'd.)

Ingredient	Quantity	
	NRG-A	NRG-B
Oats (lb.)	300	250
Wheat germ (lb.)	50	50
Cinnamon (lb.)	5	5
Nutmeg (lb.)	2	2
Cloves (lb.)	1	1
Honey (gal.)	10	10
Canola oil (gal.)	7	7
Vit./min. powder (lb.)	5	5
Carob chips (lb.)	50	
Raisins (lb.)	50	
Protein powder (lb.)		50
Hazelnuts (lb.)		30
Dates (lb.)		70

Figure 4-16 The bill of material (BOM) for Fitter Snacker's NRG bars

# Materials Requirements Planning (MRP) (cont'd.)

- Lead times and lot sizing
  - **Lead time:** cumulative time required for the supplier to receive and process the order, take the material out of stock, package it, load it on a truck, and deliver it to the manufacturer
  - **Lot sizing:** determining production quantities and order quantities
- **MRP record:** standard way of viewing the MRP process on paper

# Materials Requirements Planning (MRP) (cont'd.)

Oats	Lead time = 2 weeks	Week 1	Week 2	Week 3	Week 4	Week 5
MPS (cases)	NRG-A	984	984	984	984	1037
	NRG-B	422	422	422	422	444
MPS (500 lb. batches)	NRG-A	142	142	142	142	149
	NRG-B	61	61	61	61	64
Gross requirements (lb)		57,850	57,850	57,850	57,850	60,700
Scheduled receipts		44,000	44,000			
Planned receipts				88,000	44,000	44,000
On hand	29,650	15,800	1,950	32,100	18,250	1,550
Planned orders		88,000	44,000	44,000		

Figure 4-17 The MRP record for oats in NRG bars, weeks 1 through 5

# Materials Requirements Planning in SAP ERP

- MRP list shows results of MRP calculations
- MRP process creates planned orders to meet dependent requirements
- Stock/Requirements List shows:
  - Planned orders
  - Purchase requisitions (PurRqs)
  - Purchase orders (POitem)
- Planner can convert a planned order to a purchase order from Stock/Requirements List by double-clicking the planned order line

# Materials Requirements Planning in SAP ERP (cont'd.)

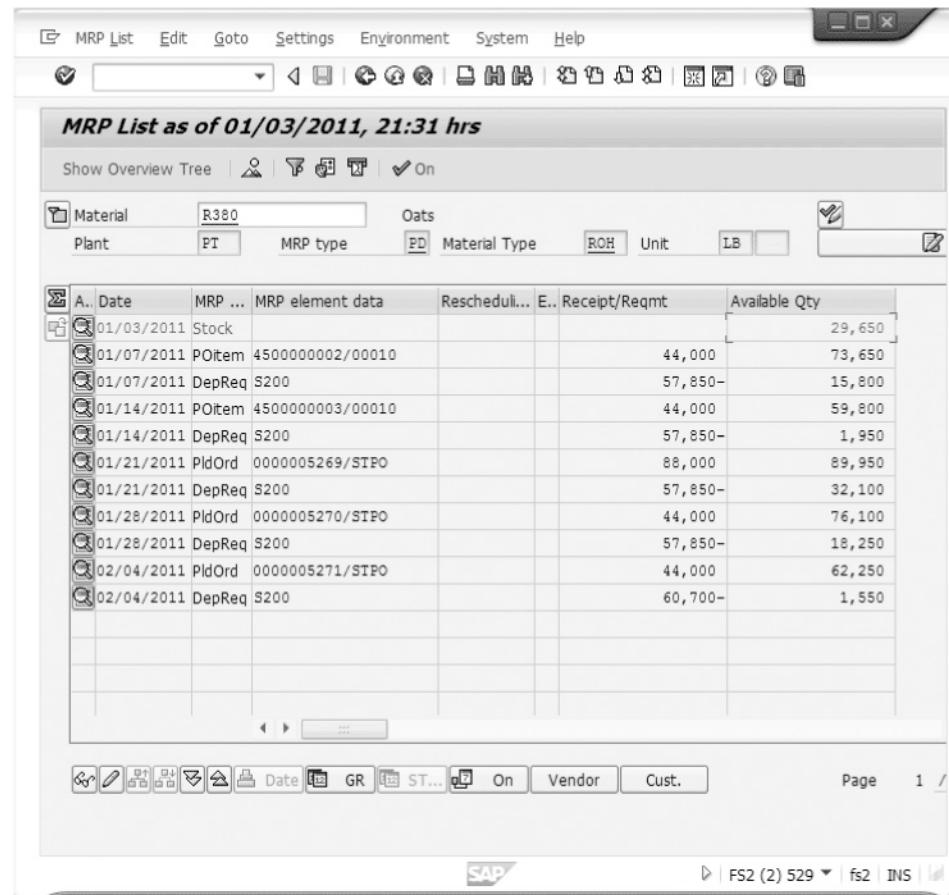


Figure 4-18 The MRP list in SAP ERP

# Materials Requirements Planning in SAP ERP (cont'd.)

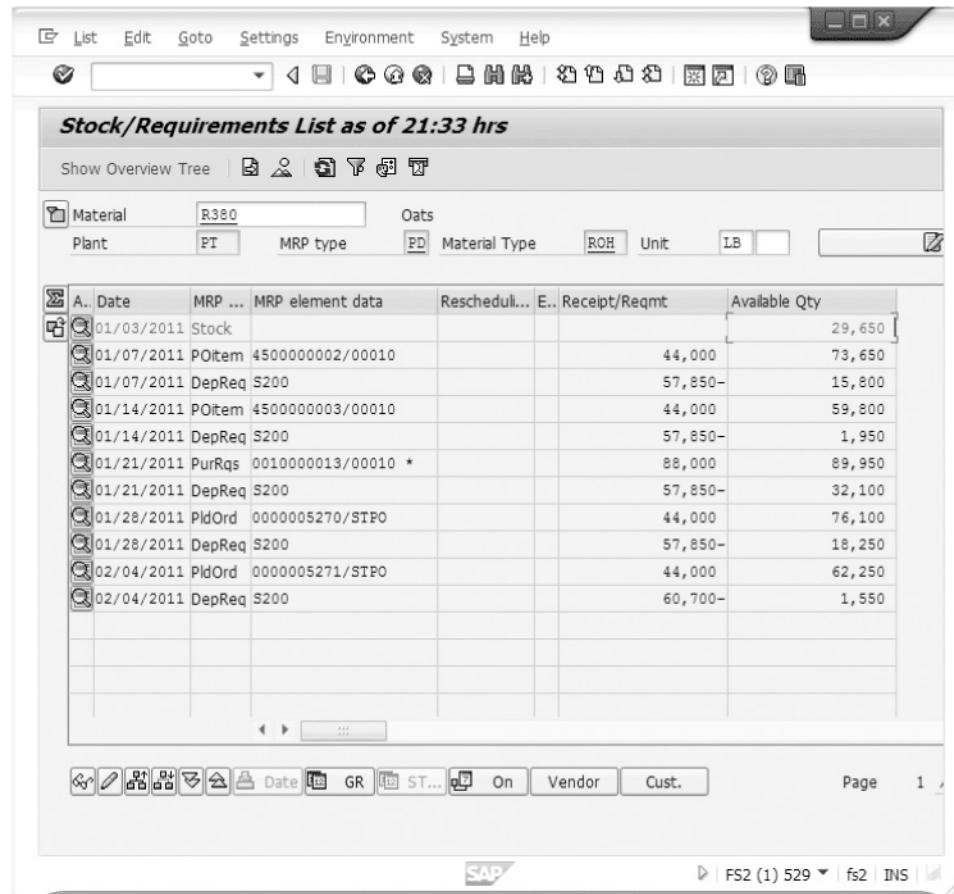


Figure 4-19 The Stock/Requirements List in SAP ERP

Additional Data for MRP Element

Plnd order	0000005270	External proc.	Order finish	01/28/2011	GR ProcTme	0
Order qty	44,000	LB	Order start	01/22/2011	Proc. type	F
Scrap	0		Planned opening	01/20/2011	Order type	NB

-> Pur.req. |

Planned order release and receipt dates  
Option to convert planned order to purchase requisition

This screenshot shows the 'Additional Data for MRP Element' dialog box in SAP ERP. It contains fields for Planned Order (number 0000005270), Order Quantity (44,000), and Scrap (0). It also displays dates for Order Start (01/22/2011), Order Finish (01/28/2011), and Planned Opening (01/20/2011). The 'Proc. type' is set to 'F' and 'Order type' to 'NB'. At the bottom, there are several icons: a checkmark, a copy icon, an edit icon, a plus icon, a minus icon, a '-> Pur.req.' button, and two empty boxes. To the right of the dialog, two callout boxes explain the 'GR ProcTme' field and the function of the '-> Pur.req.' button.

Figure 4-20 Conversion of a planned order to a requisition

# Materials Requirements Planning in SAP ERP (cont'd.)

- Integrated information system allows Purchasing to make the best decision on a vendor based on relevant, up-to-date information
- Once Purchasing employee decides which vendor to use, the purchase order is transmitted to vendor
  - System can be configured to fax order to vendor, transmit it electronically through EDI (electronic data interchange), or send it over the Internet

Source Overview for Item 00010

The screenshot shows the SAP Source Overview screen for Item 00010. At the top, there are two input fields: 'Material' with value 'R380' and 'Item' with value 'Oats'. Below these are two more fields: 'Quantity' with value '44,000' and 'Unit' with value 'LB'. The main area is a grid displaying vendor information:

Vendor	Name	Info/agmt.	Item	Net price	Crcy	Realistic D...	POrg	Pln
100000	Climax Cereals	5300002200		0.20 USD	11/04/2011	00PR 00		
100100	Grand Rapids	5300002300		0.20 USD	11/04/2011	00PR 00		
100200	Oshtemo Oats	5300002400		0.20 USD	11/04/2011	00PR 00		

At the bottom of the screen, there is a toolbar with several buttons:

- Source of supply
- Vendor
- Price simulation
- Price simulation/all
- Vendor eval.

A callout box labeled "Options to evaluate vendors" points to the "Vendor eval." button in the toolbar.

Figure 4-21 Source Overview screen for supplier selection

# Detailed Scheduling

- Detailed plan of what is to be produced, considering machine capacity and available labor
- One key decision in detailed production scheduling
  - How long to make the production runs for each product
  - Production run length requires a balance between setup costs and holding costs to minimize total costs to the company

# Detailed Scheduling (cont'd.)

- Fitter Snacker uses repetitive manufacturing
- **Repetitive manufacturing** environments usually involve production lines that are switched from one product to another similar product
  - Production lines are scheduled for a period of time, rather than for a specific number of items

# Detailed Scheduling (cont'd.)

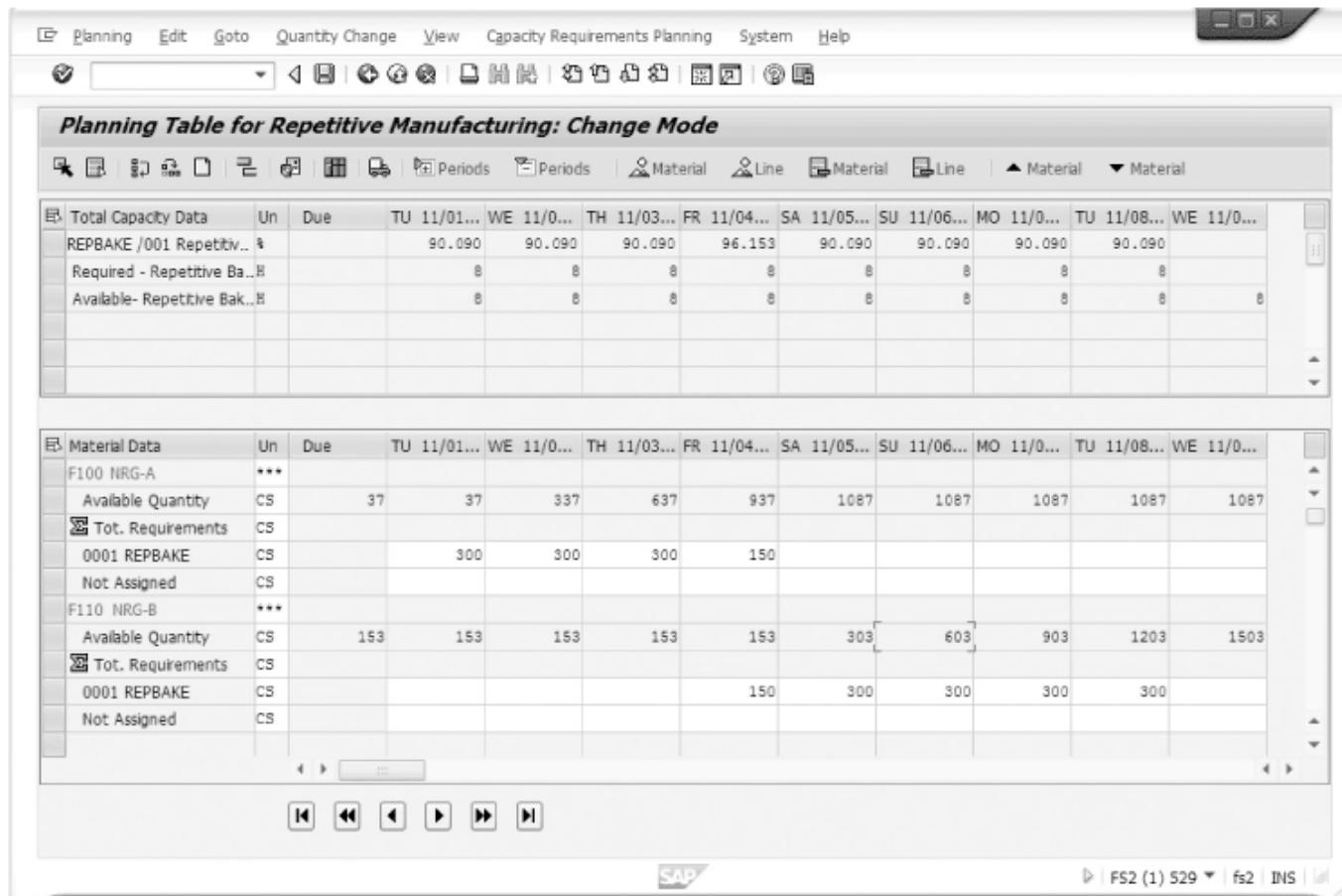


Figure 4-22 Repetitive manufacturing planning table in SAP ERP

# Detailed Scheduling (cont'd.)

- Production runs should be decided by evaluating the cost of equipment setup and holding inventory
- Integrated information system simplifies this analysis
  - Automatically collects accounting information that allows managers to better evaluate schedule trade-offs in terms of costs to company

# Providing Production Data to Accounting

- In the manufacturing plant, ERP packages do not directly connect with production machines
- Data can be entered into SAP ERP through a PC on the shop floor, scanned by a barcode reader or radio frequency identification (RFID) technology, or a mobile device
- In an integrated ERP system, the accounting impact of a material transaction can be recorded automatically

# Providing Production Data to Accounting (cont'd.)

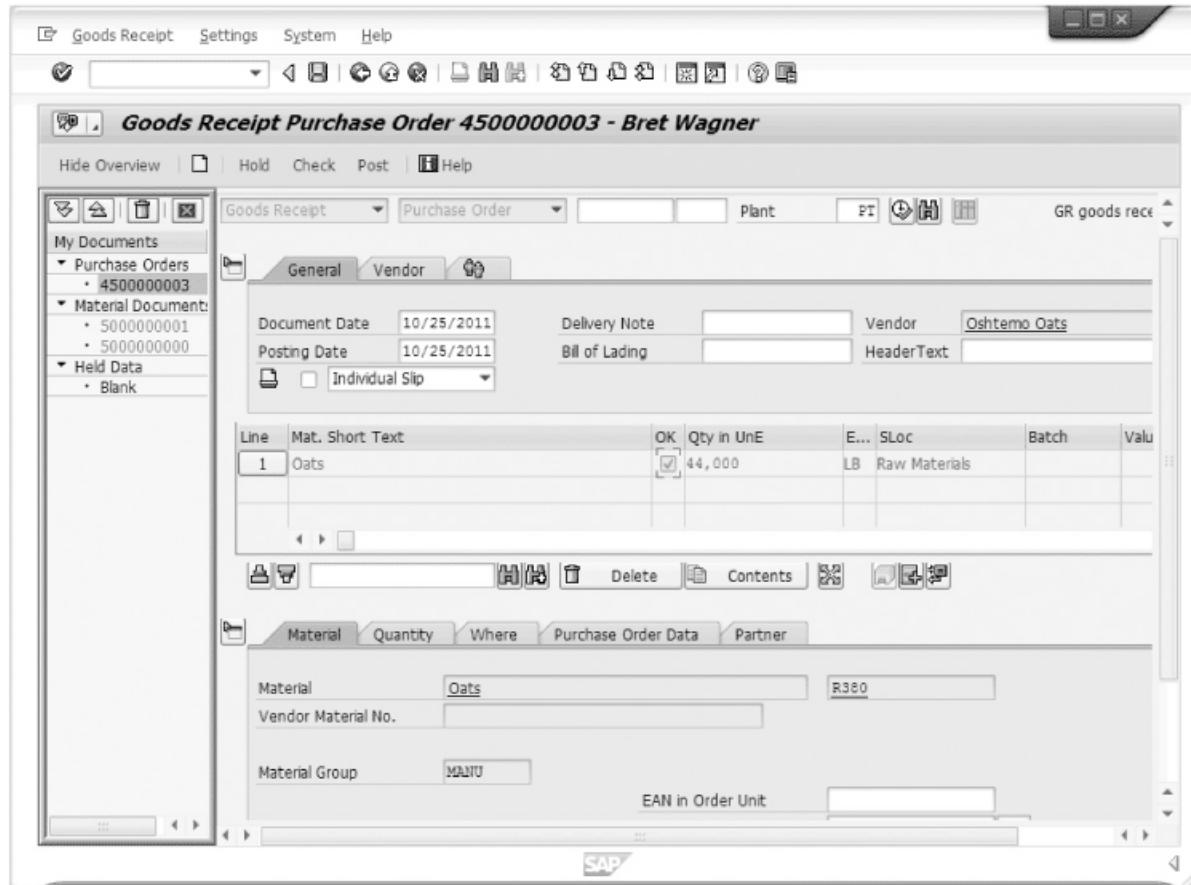


Figure 4-23 Goods receipt screen in SAP ERP

# Providing Production Data to Accounting (cont'd.)

- Once FS accepts shipment, Receiving must notify SAP ERP system of the arrival and acceptance of the material
  - Goods receipt transaction
- Receiving department must match goods receipt with purchase order that initiated it
- When receipt is successfully recorded, SAP ERP system immediately records the increase in inventory levels for the material

# ERP and Suppliers

- Fitter Snacker is part of a supply chain
  - Starts with farmers growing oats and wheat
  - Ends with a customer buying an NRG bar from a retail store
- ERP systems can play a key role in collaborative planning

# ERP and Suppliers (cont'd.)

- Working with suppliers in a collaborative fashion requires trust among all parties
  - Company opens its records to its suppliers
  - Suppliers can read company's data because of common data formats
- Advantages
  - Reductions in paperwork
  - Savings in time
  - Other efficiency improvements

# The Traditional Supply Chain

- **Supply chain:** all activities that occur between the growing or mining of raw materials and the appearance of finished products on the store shelf
- Traditional supply chain
  - Information is passed through the supply chain reactively as participants increase their product orders
  - Inherent time lags cause problems

# The Traditional Supply Chain (cont'd.)

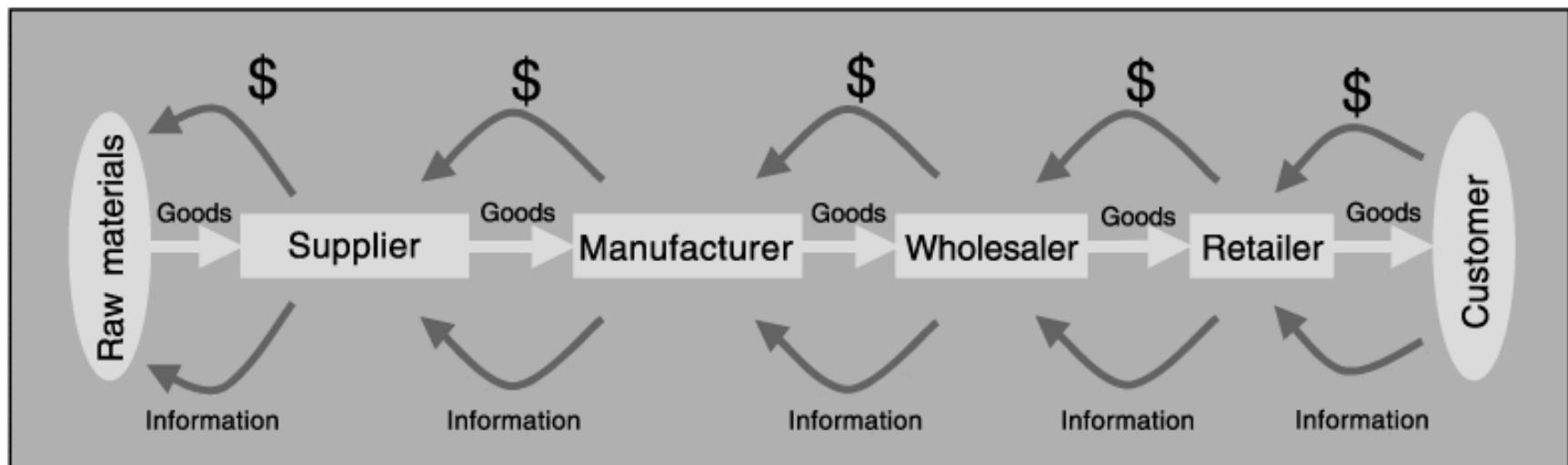


Figure 4-24 Supply chain management (SCM) from raw materials to consumer

# The Traditional Supply Chain (cont'd.)

- EDI and ERP
  - Before ERP systems were available, companies could be linked with customers and suppliers through electronic data interchange (EDI) systems
  - Well-developed ERP system can facilitate SCM
    - Needed production planning and purchasing systems already in place
  - With ERP system, sharing production plans along the supply chain can occur in real time

# The Measures of Success

- Performance measurements
  - Metrics
  - Show the effects of better supply chain management
- **Cash-to-cash cycle time**
  - Time between paying for raw materials and collecting cash from customer
- SCM costs
  - Include cost of buying and handling inventory, processing orders, and information systems support

# The Measures of Success (cont'd.)

- **Initial fill rate**
  - Percentage of the order that the supplier provided in the first shipment
- **Initial order lead time**
  - Time needed for the supplier to fill the order
- **On-time performance**
  - If supplier agreed to requested delivery dates, tracks how often supplier actually met those dates

# Summary

- ERP system can improve the efficiency of production and purchasing processes
  - Efficiency begins with Marketing sharing a sales forecast
  - Production plan is created based on sales forecast and shared with Purchasing so raw materials can be ordered properly

# Summary (cont'd.)

- Companies can do production planning without an ERP system, but an ERP system increases company's efficiency
  - ERP system that contains materials requirements planning allows Production to be linked to Purchasing and Accounting
  - This data sharing increases a company's overall efficiency

# Summary (cont'd.)

- Companies are building on their ERP systems and integrated systems philosophy to practice supply chain management (SCM)
  - SCM: company looks at itself as part of a larger process that includes customers and suppliers
  - Using information more efficiently along the entire chain can result in significant cost savings
  - Complexity of the global supply chain
    - Developing a planning system that effectively coordinates information technology and people is a considerable challenge



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Five*  
*Accounting in ERP Systems*

# Policies for students

- These contents are only used for students PERSONALLY.
- Students are NOT allowed to modify or deliver these contents to anywhere or anyone for any purpose.

# Objectives

After completing this chapter, you will be able to:

- Describe the differences between financial and managerial accounting
- Identify and describe problems associated with accounting and financial reporting in unintegrated information systems
- Describe how ERP systems can help solve accounting and financial reporting problems in an unintegrated system

# Objectives (cont'd.)

- Describe how the Enron scandal and the Sarbanes-Oxley Act have affected accounting information systems
- Explain accounting and management-reporting benefits that accrue from having an ERP system
- Explain the importance of Extensible Business Reporting Language (XBRL) in financial reporting

# Introduction

- In this chapter, you will learn about the activities in the Accounting functional area
- Accounting is tightly integrated with all other functional areas
- Accounting activities are necessary for decision making

# Accounting Activities

- Areas of accounting:
  - Financial accounting
  - Managerial accounting
- **Financial accounting**
  - Documenting all transactions of a company that have an impact on the financial state of the firm
  - Using documented transactions to create reports for external parties and agencies
  - Reports, or financial statements, must follow prescribed rules and guidelines of various agencies

# Accounting Activities (cont'd.)

- Common financial statements: balance sheets and income statements
- **Balance sheet**
  - Statement that shows account balances such as:
    - Cash held
    - Amounts owed to company by customers
    - Cost of raw materials and finished-goods inventory
    - Long-term assets such as buildings
    - Amounts owed to vendors, banks, and other creditors
    - Amounts owners have invested in company

Fitter Snacker Balance Sheet December 31, 2011 (in thousands of dollars)		
<b><u>Assets</u></b>		
Cash		\$5,003
Accounts receivable		\$4,715
Inventories		\$9,025
Plant and equipment		\$6,231
Land		\$1,142
Total assets		\$26,116
<b><u>Liabilities</u></b>		
Accounts payable	\$6,400	
Notes payable	\$10,000	
Total liabilities		\$16,400
<b><u>Stockholders' Equity</u></b>		
Contributed capital	\$2,000	
Retained earnings	\$7,716	
Total stockholders' equity		\$9,716
Total liabilities and stockholders' equity		\$26,116

Figure 5-1 Fitter Snacker sample balance sheet

# Accounting Activities (cont'd.)

- **Income statement**
  - **Profit and loss (P&L) statement**
  - Shows company's sales, cost of sales, and profit or loss for a period of time (typically a quarter or year)
- Integrated information system simplifies the process of closing the books and preparing financial statements
- **Managerial accounting:** determining costs and profitability of company's activities

<b>Fitter Snacker Balance Sheet</b> <b>December 31, 2011</b> <b>(in thousands of dollars)</b>		
<b>Assets</b>		
Cash		\$5,003
Accounts receivable		\$4,715
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Total assets		\$26,116
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Total liabilities		\$16,400
<b>Stockholders' Equity</b>		
Contributed capital	\$2,000	
Retained earnings	\$7,716	
Total stockholders' equity		\$9,716
Total liabilities and stockholders' equity		\$26,116

Figure 5-2 Fitter Snacker sample income statement

# Accounting Activities (cont'd.)

- Quarterly financial statement
  - Close books
  - Closing entries to nominal accounts
  - Nominal accounts – zero balance to start next cycle
  - Ensure accounts accurate and up-to-date
  - “Adjusting” entries
- Integrated information system advantage
  - Simplifies process of closing books and preparing financial statements

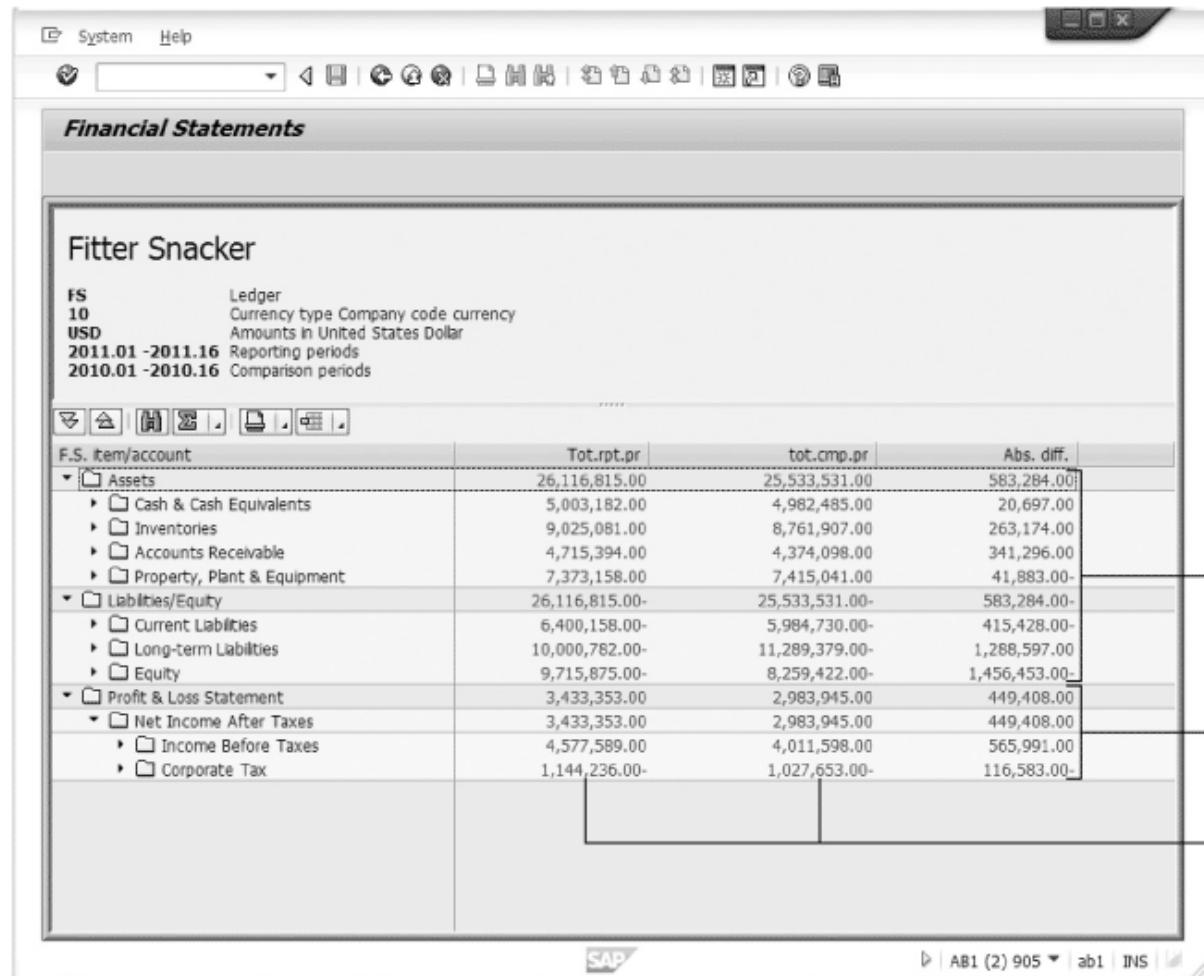


Figure 5-3 Balance sheet and income statement for Fitter Snacker in SAP ERP system

# Accounting Activities (cont'd.)

- Managerial accounting
  - Determine costs and profitability of company's activities
  - Provide managers with detailed information
    - Informed decisions
    - Create budgets
    - Determine profitability
  - Information that managers use to control day-to-day activities, develop long-term plans

# Using ERP for Accounting Information

- Problems associated with unintegrated systems
  - Data sharing usually did not occur in real time
    - Accounting's data were often out of date
  - Accounting personnel had to do significant research
- ERP system, with its centralized database, avoids these problems
- In traditional accounting, company's accounts are kept in a record called a **general ledger**

# Using ERP for Accounting Information (cont'd.)

- In the SAP ERP system, input to general ledger occurs simultaneously with business transactions
- Many SAP ERP modules cause transaction data to be entered into general ledger, including:
  - Sales and Distribution (SD)
  - Materials Management (MM)
  - Financial Accounting (FI)
  - Controlling (CO)
  - Human Resources (HR)
  - Asset Management (AM)

# Operational Decision-Making Problem: Credit Management

- Unintegrated information system
  - Out-of-date or inaccurate accounting data can cause problems when a company is making operational decisions
- Industrial credit management
- Fitter Snacker's credit management procedures
- Credit management in SAP ERP

# Industrial Credit Management

- Credit management requires a good balance between:
  - Granting sufficient credit to support sales *and*
  - Making sure that the company does not lose too much money
- Setting a limit on how much money a customer can owe at any one time
  - Monitoring that limit as orders come in and payments are received

# Industrial Credit Management (cont'd.)

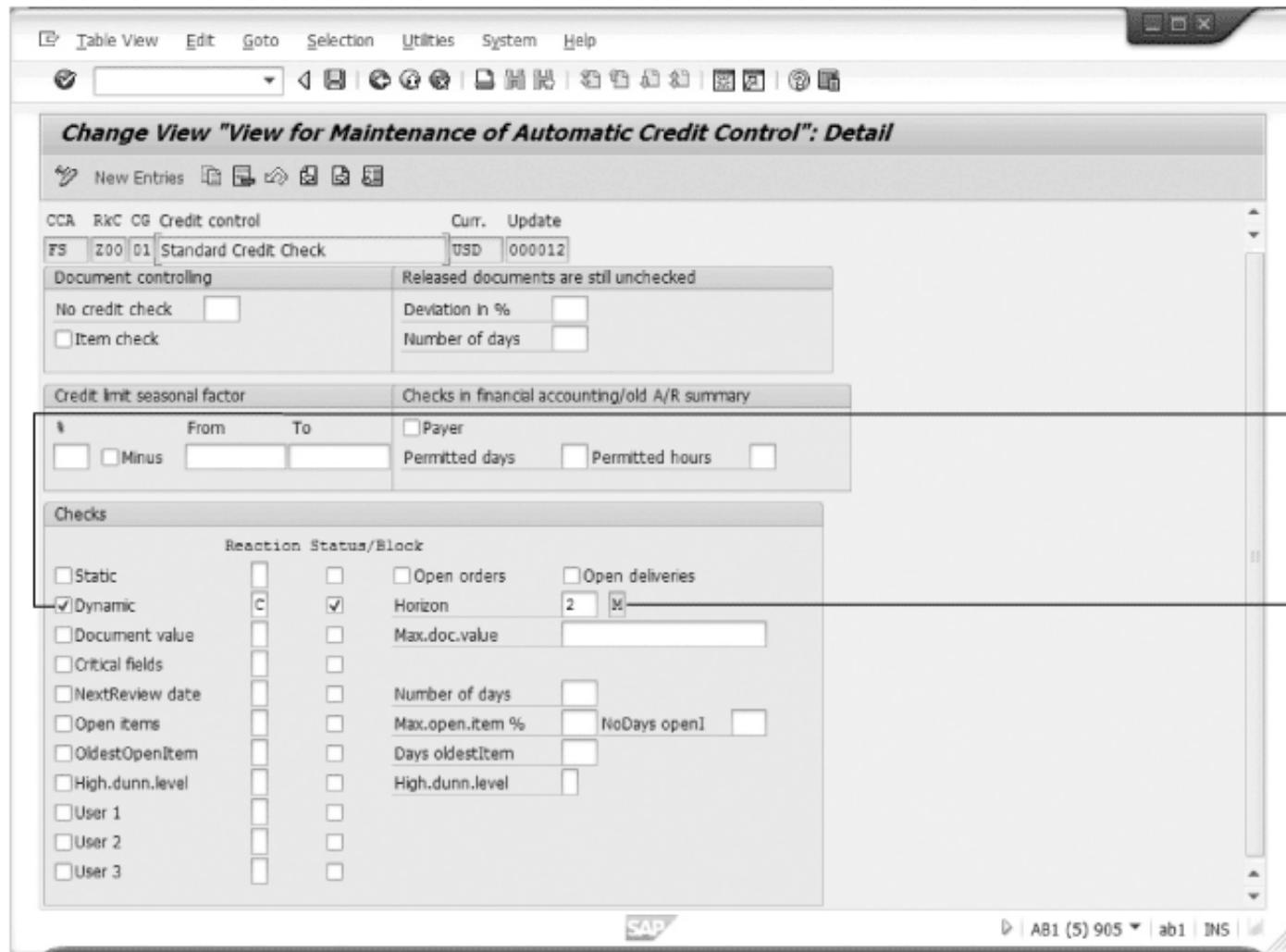
- Sales representative needs to be able to review an up-to-date accounts receivable balance when an order comes in
- Problems arise if Marketing and Accounting have unintegrated information systems
  - Less than full cooperation on updates
- Problems should not arise with an integrated information system
  - Accounts receivable is immediately updated

# Fitter Snacker's Credit Management Procedures

- FS sales clerk refers to a weekly printout of a customer's current balance and credit limit to see if credit should be granted
- Sales data are transferred to Accounting by disk three times a week
- Accounting clerk can use sales input to prepare a customer invoice
- Accounting must make any adjustments for partial shipments before preparing the invoice
- Accounting clerks process customer payments

# Credit Management in SAP ERP

- SAP ERP would allow FS to set a credit limit for each customer
- Company can configure any number of credit-check options in SAP ERP system
- Advantages of using SAP ERP to manage credit
  - Process is automated
  - Data are available in real time



Dynamic credit check with Reaction C selected

Two-month credit check horizon

Figure 5-5 Credit management configuration

# Product Profitability Analysis

- Business managers use accounting data to perform profitability analyses of a company and its products
- When data are inaccurate or incomplete, the analyses are flawed
- Main reasons for inaccurate or incomplete data
  - Inconsistent recordkeeping
  - Inaccurate inventory costing systems
  - Problems consolidating data from subsidiaries

Credit management Edit Goto Extras Environment System Help

Customer Credit Management Change: Overview

Administrative data

Customer	201	Health Express
Credit control area	FS	FS Credit Control Area
Currency	USD	

Status

Credit limit	1,000.00
Credit exposure	590.00
Cred.limitused	59.00 %
Horizon	03/01/2012

Dunning data

Dunning Area	
Last dunned	
Leg.dunn.proc.	
Dunning level	0

Payment history/arrears

Wth cash disc.	0.00	0
W/o cash disc.	0.00	0

Control

Risk category	Z00
Last int.review	
<input type="checkbox"/> Blocked	
Cred.rep.grp	
Payment index	
Rating	
Last ext.review	
Monitoring	

Credit limit

Amount of credit used

The screenshot shows the SAP Customer Credit Management Change: Overview screen for customer 201, Health Express. The status section displays a credit limit of 1,000.00, which is highlighted by a callout labeled 'Credit limit'. Another callout labeled 'Amount of credit used' points to the 'Cred.limitused' field, which shows 59.00%. Other visible data includes credit exposure of 590.00, a horizon date of 03/01/2012, and various control parameters like risk category Z00 and monitoring levels.

Figure 5-6 Credit management for Health Express

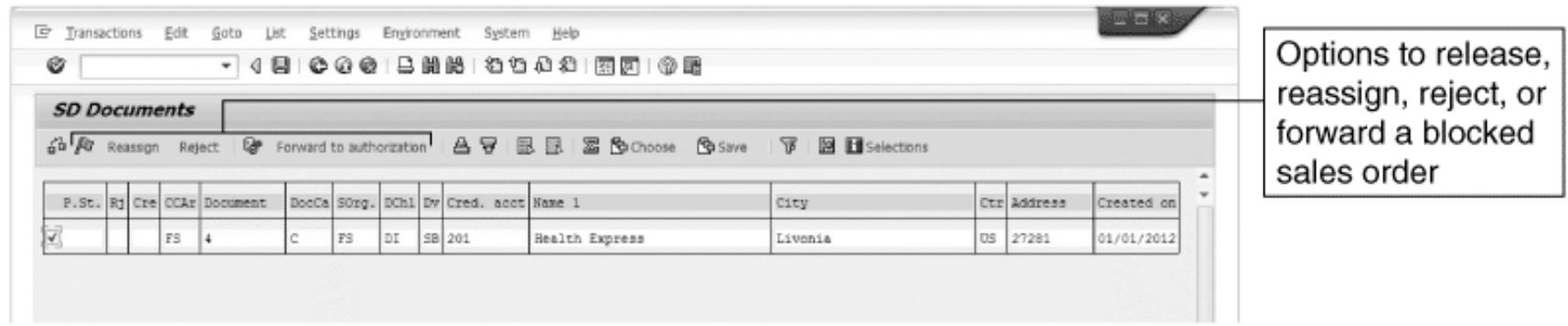


Figure 5-7 Blocked sales order

# Inconsistent Recordkeeping

- Each of FS's marketing divisions maintains its own records and keeps track of sales data differently
- Paper records might be inaccurate or missing, making validity of the final report questionable
- Without integrated information systems, accounting and reporting to management requires:
  - Working around limitations of information systems to produce useful output
- ERP system minimizes or eliminates these problems

# Inaccurate Inventory Costing Systems

- Correctly calculating inventory costs
  - One of the most important and challenging accounting tasks in any manufacturing company
- Inventory cost accounting background
  - Manufactured item's cost has three elements:
    - Cost of raw materials
    - Cost of labor employed directly in production of item
    - **Overhead:** all other costs

# Inaccurate Inventory Costing Systems (cont'd.)

- Inventory cost accounting background (cont'd.)
  - **Direct costs:** materials and labor
    - Can be estimated fairly accurately
  - **Indirect costs:** overhead items
    - Difficult to associate with specific product(s)
  - **Standard costs** for a product are established by:
    - Studying historical direct and indirect cost patterns
    - Taking into account the effects of current manufacturing changes
  - **Cost variances:** differences between actual costs and standard costs

# Inaccurate Inventory Costing Systems (cont'd.)

- ERP and inventory cost accounting
  - Many companies with unintegrated accounting systems analyze their cost variances infrequently
    - Often, they do not know how much it actually costs to produce a unit of a product
  - If FS had an ERP system, employees throughout the company would have recorded costs in a company-wide database as they occurred
  - ERP system configurations allow analysts to track costs using many bases

# Inaccurate Inventory Costing Systems (cont'd.)

- Product costing example
  - Suppose Fitter Snacker wishes to update standard costs for NRG-A bars
  - Product cost analysis for NRG-A bar
- Product cost analysis in SAP ERP
  - **Product cost variant:** method for developing a product cost in an ERP system

NRG-A Bar Product Cost Analysis (7 cases)				
Ingredient	Unit of measure	NRG-A	Cost per unit of measure	Direct material cost
Oats	lb	300	\$0.20	\$60.00
Wheat germ	lb	50	\$0.30	\$15.00
Cinnamon	lb	5	\$3.00	\$15.00
Nutmeg	lb	2	\$4.50	\$9.00
Cloves	lb	1	\$5.50	\$5.50
Honey	gal	10	\$6.40	\$64.00
Canola	gal	7	\$1.70	\$11.90
Vit./min. powder	lb	5	\$18.45	\$92.25
Carob chips	lb	50	\$2.10	\$105.00
Raisins	lb	50	\$3.20	\$160.00
Total direct material cost				\$537.65
Production overhead cost (100% of Total direct material)				\$537.65
Direct labor				54.50
Cost of goods manufactured (COGM)				1,129.80
Sales and administrative costs (30% of COGM)				338.94
Cost of goods sold (COGS)				1,468.74
COGM per case				\$161.40
COGS per case				\$209.82

Figure 5-8 Product cost analysis for NRG-A bar

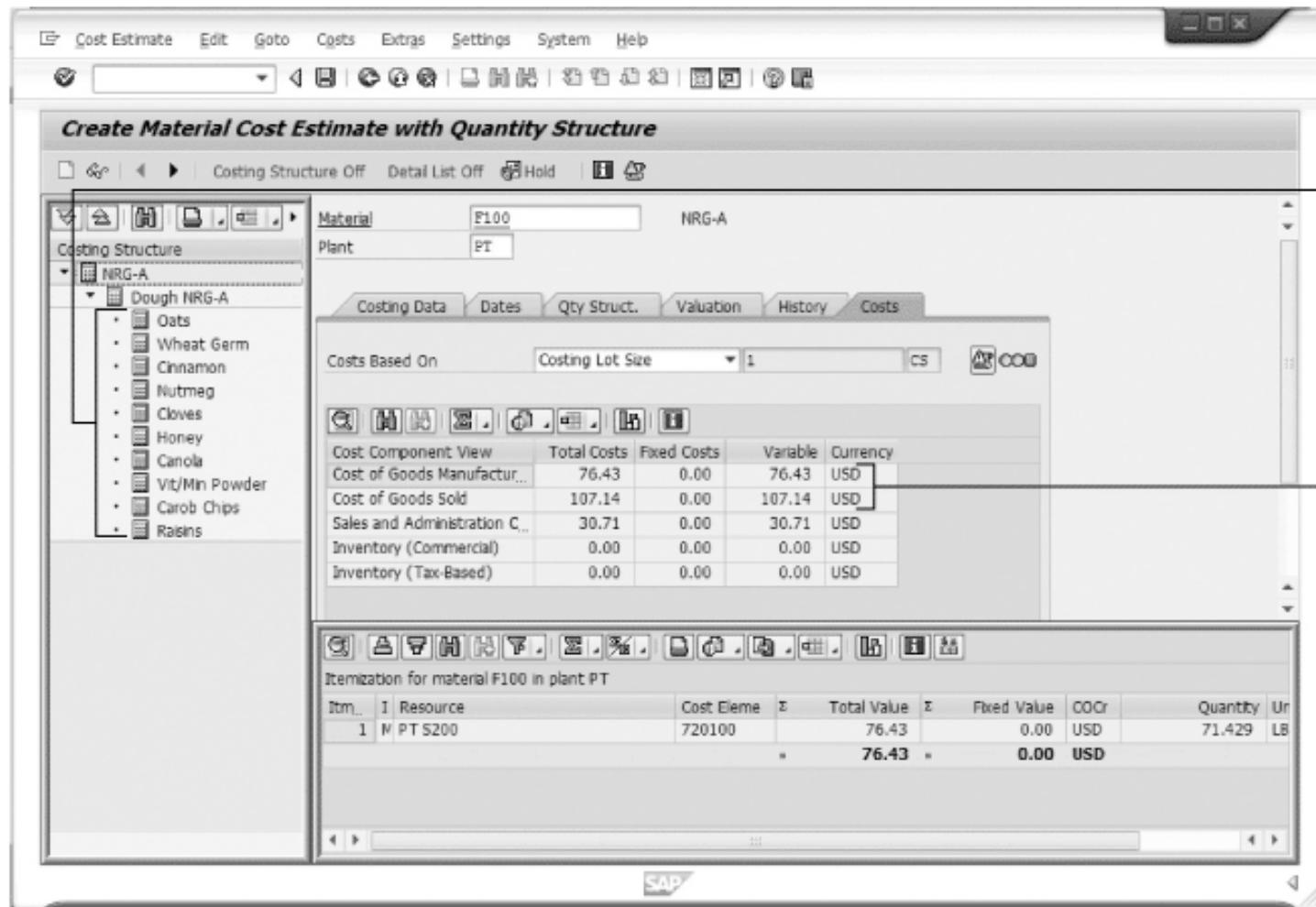


Figure 5-9 Product cost analysis result in SAP ERP

# Inaccurate Inventory Costing Systems (cont'd.)

- Activity-based costing and ERP
  - **Activity-based costing (ABC)**
    - Accountants identify activities associated with overhead cost generation and then keep records on costs *and* on activities
  - ABC requires more bookkeeping than traditional costing methods

# Companies with Subsidiaries

- Account balances for each entity must be compiled and forwarded to the home office
- Consolidated statement for the company as a whole must be created
- Currency translation
  - Problems when **currency translation** is needed for a subsidiary's accounts
- Intercompany transactions
  - Transactions that occur between companies and their subsidiaries

# Management Reporting with ERP Systems

- Generating the right reports for the right situation is often challenging
- Without an ERP system, the job of tracking all the numbers that need to go into a report is a monumental undertaking
- With ERP system, vast amount of information is available for reporting purposes

# Document Flow for Customer Service

- With an ERP system, all transactions in all areas of a company get posted in a centralized database
- Each transaction posted in SAP ERP gets its own unique document number
  - Allows quick access to the data
- In SAP ERP, document numbers for related transactions are associated in the database
  - Provides an electronic audit trail

# Document Flow for Customer Service (cont'd.)

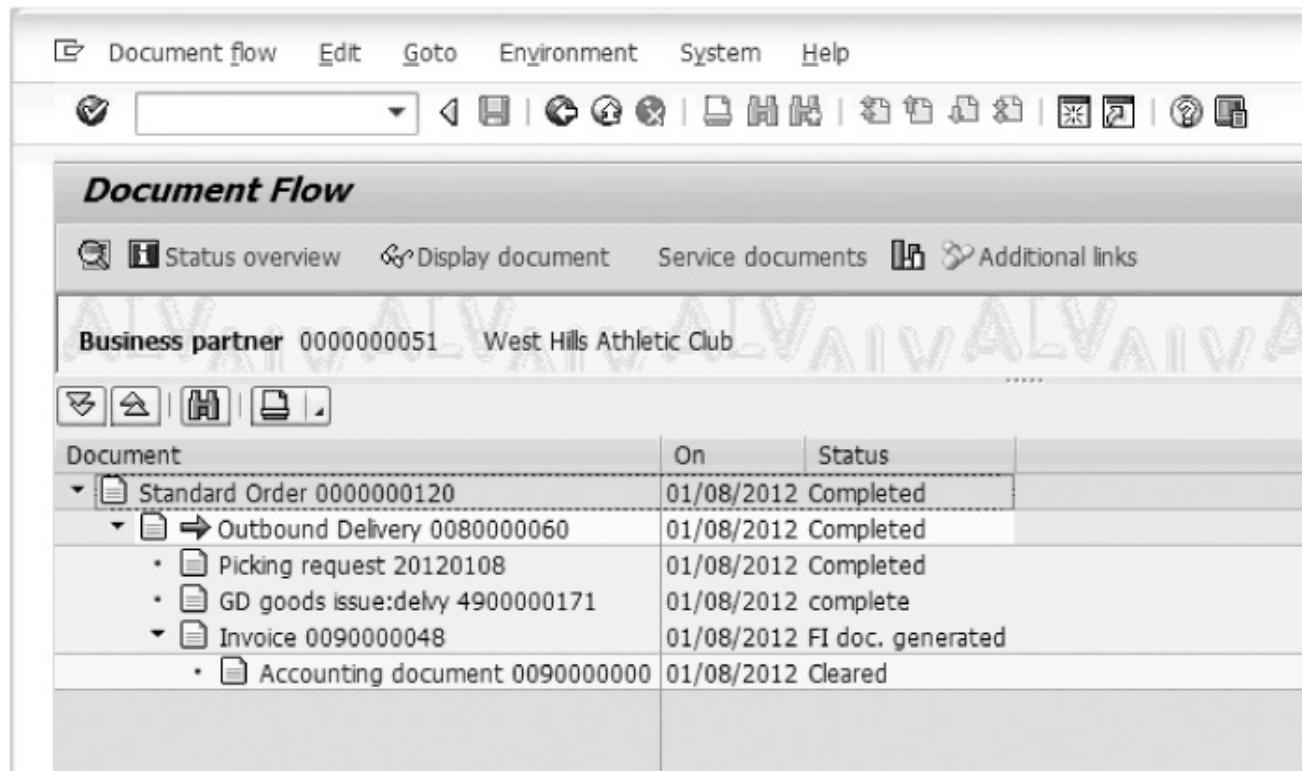


Figure 5-10 Document flow of a transaction in SAP ERP

# Built-In Management-Reporting and Analysis Tools

- Accounting records maintained in the common database
- Advantage of using a database is the ability to query the records to:
  - Produce standard reports
  - Answer ad hoc questions
- SAP provides a **data warehouse** within each major module
  - Data warehouse: repository for data from various sources

# The Enron Collapse

- October 16, 2001: Enron was one of the world's largest electricity and natural gas traders
  - Reported a \$618 million third-quarter loss and disclosed a \$1.2 billion reduction in shareholder equity
- U.S. Securities and Exchange Commission (SEC) inquiry into possible conflict of interest related to company's dealings with partnerships run by CFO Fastow

# The Enron Collapse (cont'd.)

- Volume of financial contracts was far greater than volume of contracts to actually deliver commodities
- Some partnerships were faked to mask billions of dollars in debt
- Enron's financial statements had been audited by Arthur Andersen, a highly regarded accounting firm
- Andersen employees on the Enron engagement team were instructed to destroy documentation relating to Enron

# Outcome of the Enron Scandal

- Shareholders lost an estimated \$40 billion dollars
- Thousands of workers lost their jobs
- 31 individuals were either charged or pled guilty to criminal charges
- Jurors convicted accounting firm Arthur Andersen for obstructing justice by destroying Enron documents
- U.S. Congress passed Sarbanes-Oxley Act of 2002
  - Act was designed to prevent the kind of fraud and abuse that led to the Enron downfall

# Key Features of the Sarbanes-Oxley Act

- Designed to encourage top management accountability in firms that are publicly traded in the United States
- Title IX
  - Financial statements filed with the Securities and Exchange Commission must include a statement signed by the chief executive officer and chief financial officer, certifying that the financial statement complies with SEC rules

# Key Features of the Sarbanes-Oxley Act (cont'd.)

- Title II
  - Auditor independence
    - Limits non-audit services that an auditor can provide
- Title IV
  - More stringent requirements for financial reporting

# Implications of the Sarbanes-Oxley Act for ERP Systems

- To meet the internal control report requirement, a company must:
  - Document the controls that are in place
  - Verify that the controls are not subject to error or manipulation
- Companies with ERP systems in place will have an easier time complying with the Sarbanes-Oxley Act than will companies without ERP

# Archiving

- SAP ERP software offers very few ways to delete items
- Data are removed from SAP ERP system only after they have been recorded to media (tape backup, DVD-R) for permanent storage
- **Archive:** permanent storage
- SAP ERP systems keep track of when data are created or changed
  - Change Record

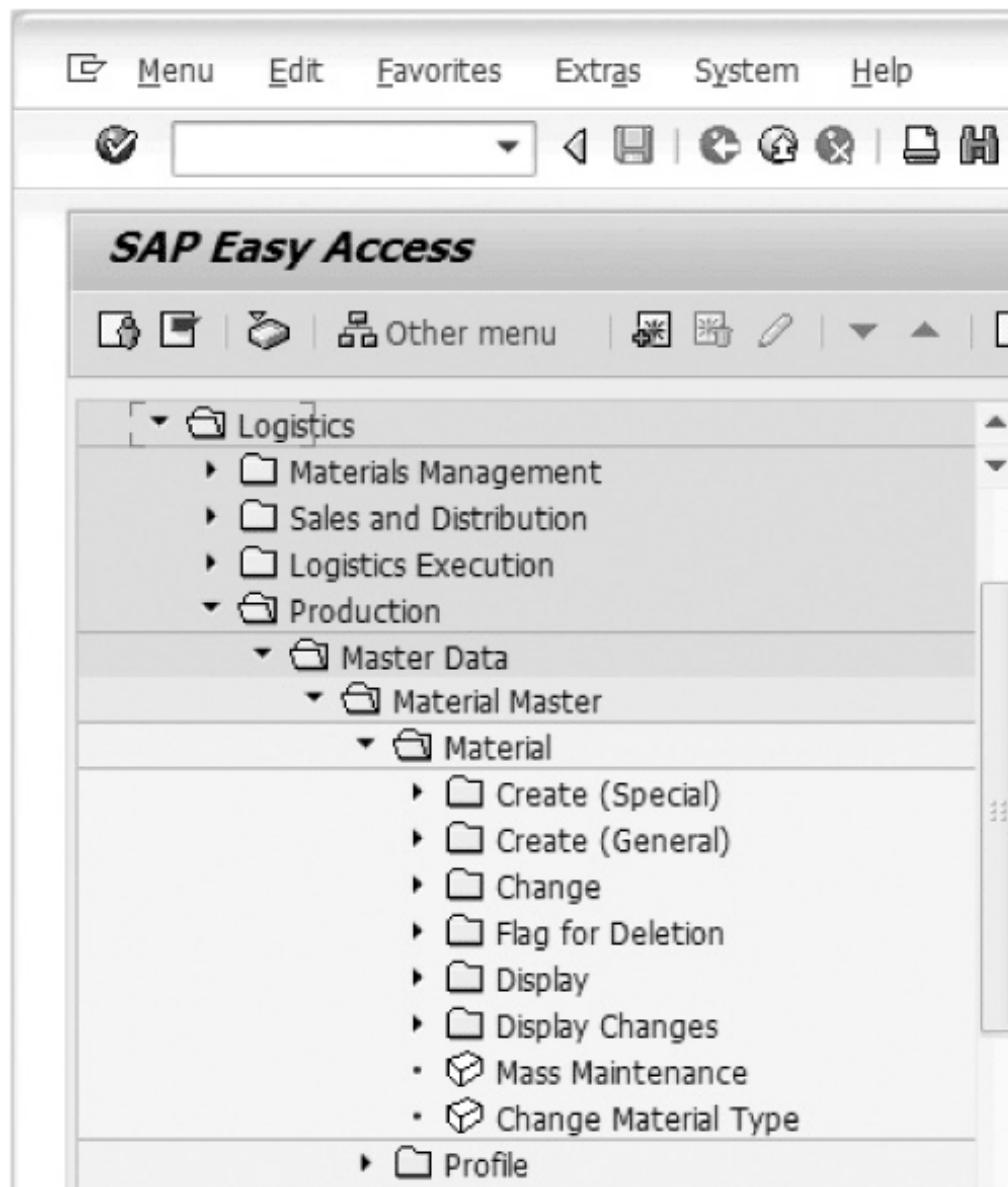


Figure 5-11 Transaction options for material master data

# Archiving (cont'd.)

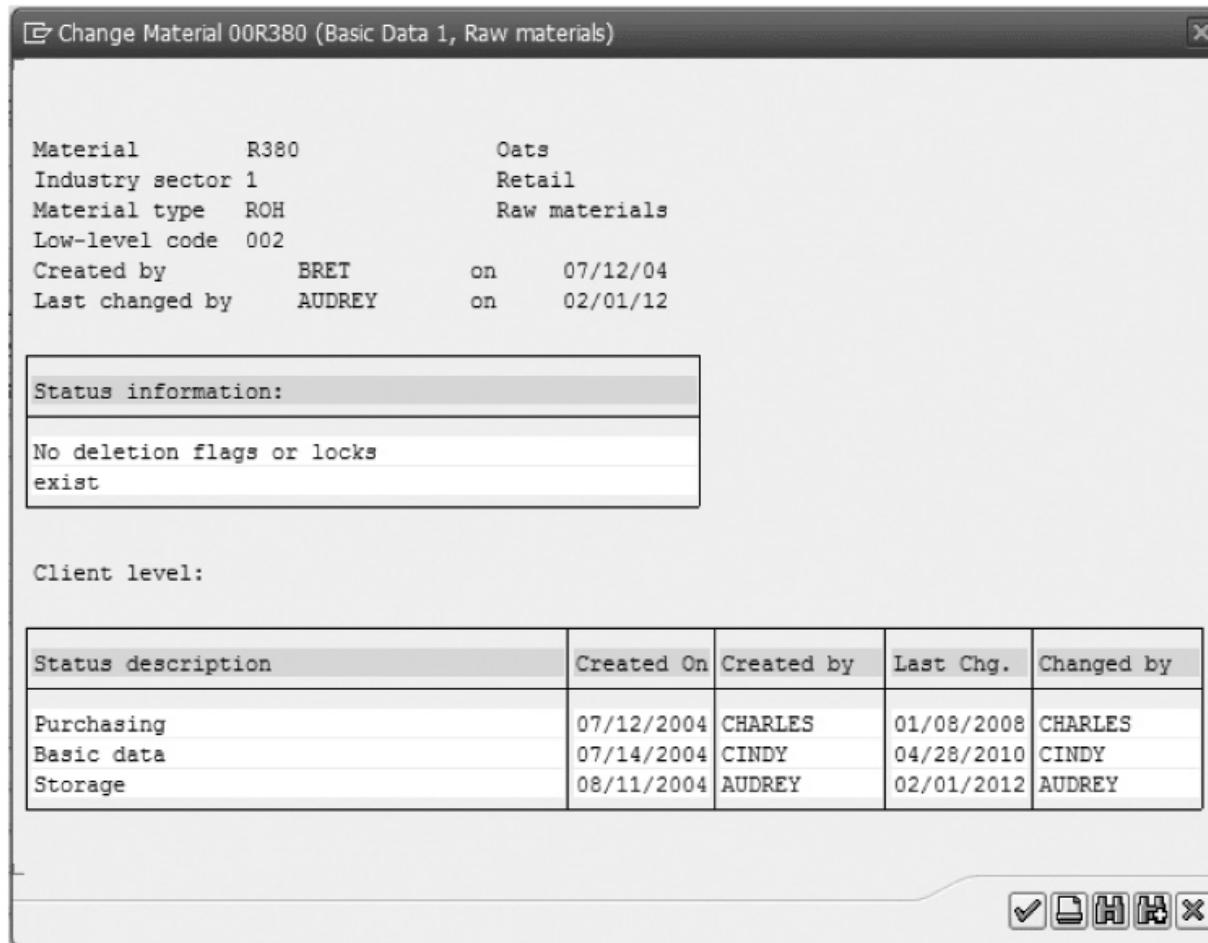


Figure 5-12 Change Record for material master

# User Authorizations

- SAP ERP has sophisticated user administration tools that allow different levels of authorization management
  - Ensure that employees can perform only the transactions required for their jobs
- Profile Generator
  - Provides a simple method for selecting functions that a user should be allowed to perform

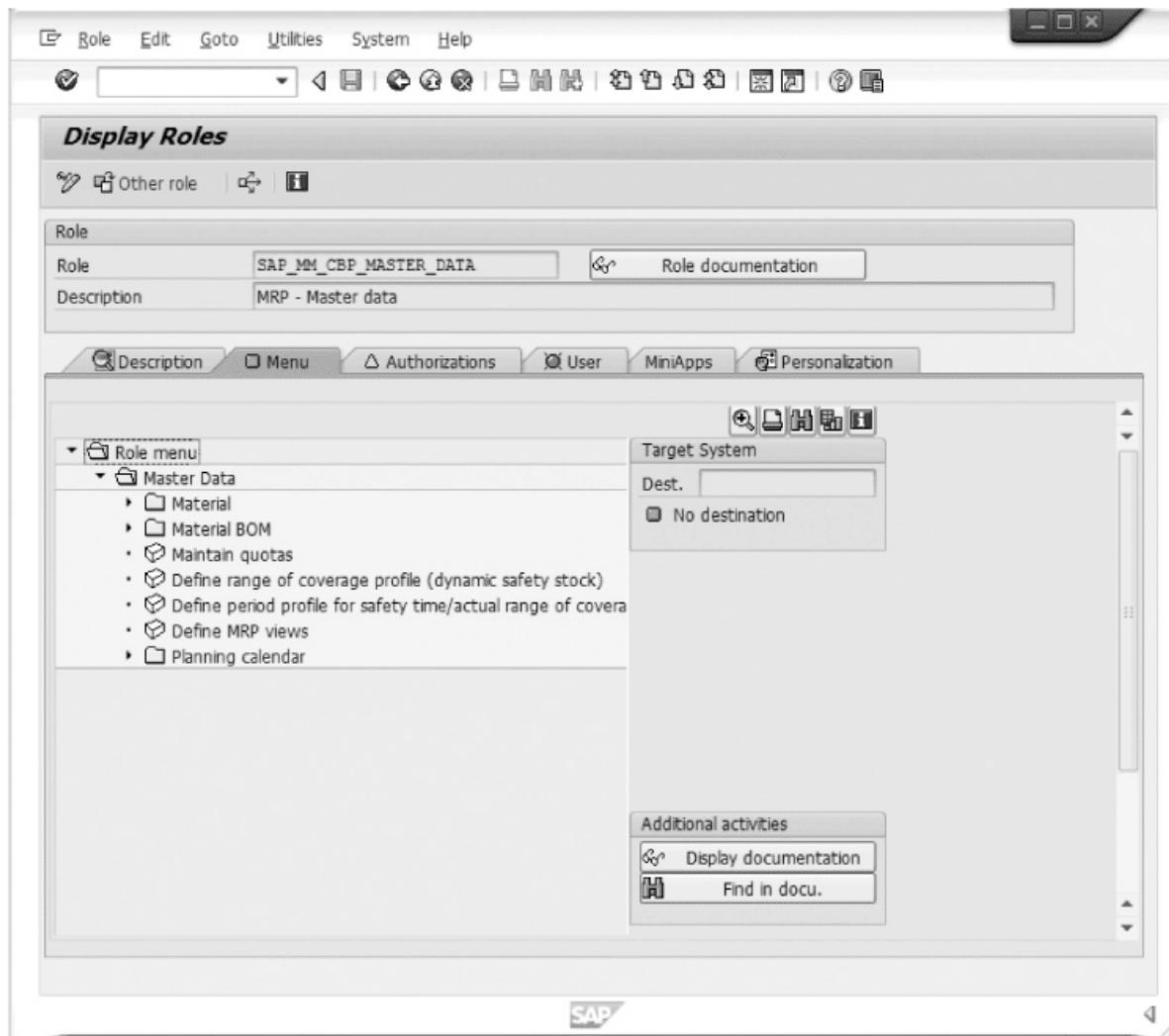


Figure 5-13 Display Roles screen in SAP

# Tolerance Groups

- Setting limits on the size of transaction an employee can process
  - In an SAP ERP system, this is done using tolerance groups
- Tolerance groups
  - Preset limits on an employee's ability to post transactions
  - Set limits on the dollar value for a single item in a document as well as the total value of document

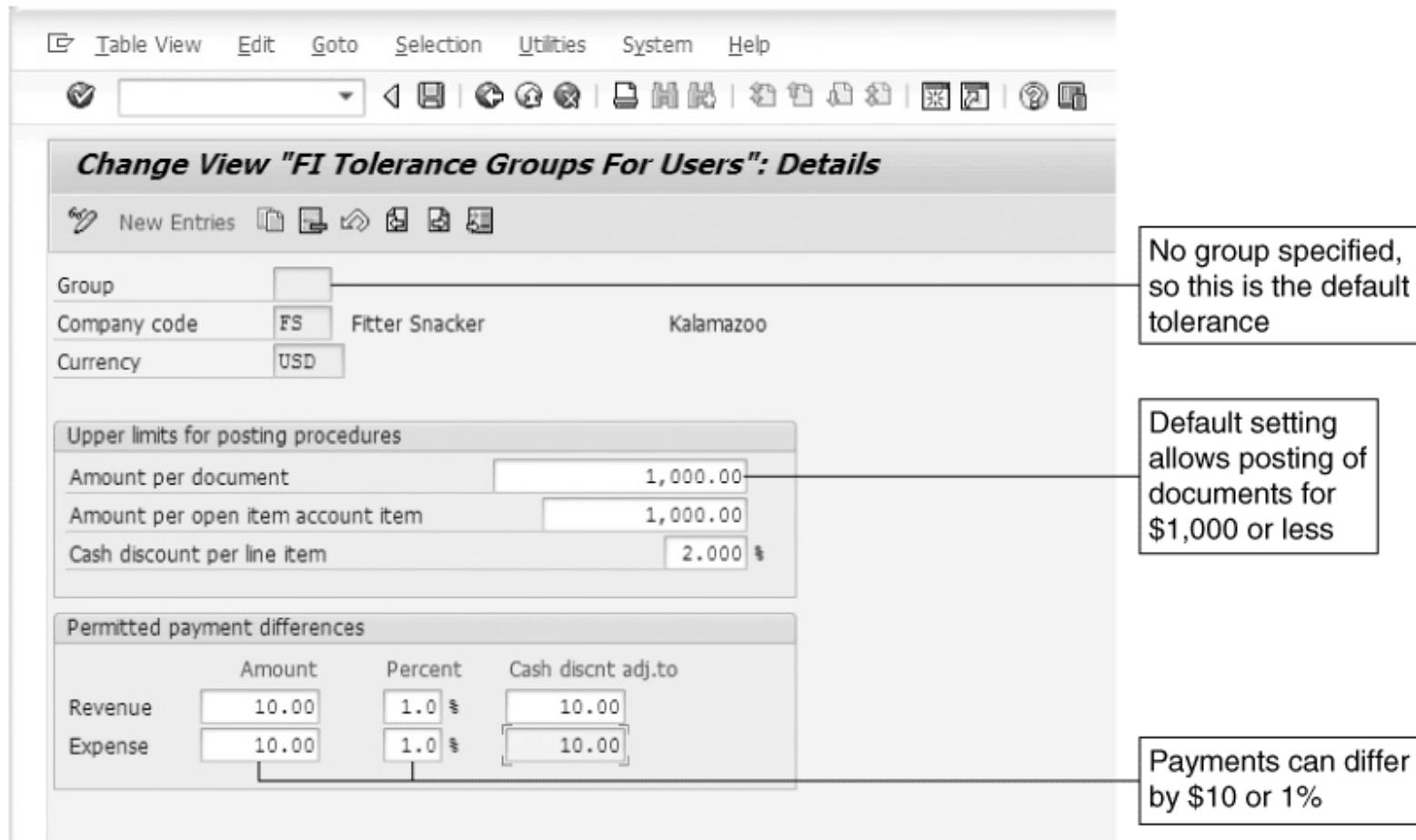


Figure 5-14 Default tolerance group

# Financial Transparency

- ERP systems provide the ability to drill down from a report to the source documents (transactions) that created it
  - Makes it easier for auditors to confirm the integrity of reports
- With a properly configured and managed ERP system, there are direct links between the company's financial statements and individual transactions that make up the statements
  - Fraud and abuse can be detected more easily

The screenshot shows the SAP ERP interface for executing G/L account balances. The title bar reads "Execute G/L Account - Balances: Overview". The menu bar includes Report, Edit, Goto, Navigate, Extras, Settings, System, and Help. Below the menu is a toolbar with various icons. The main area displays a table titled "G/L Account - Balances" with the current date "01/08/2012 16:38:10". The table has two sections: "Navigation" and "Account". The "Navigation" section shows "Currency Type: Document currency" and "Currency: US Dollar". The "Account" section lists two rows: "Raw Material Consumption Expense" and "#Result". Both rows show a debit balance of 8,810.00.

G/L Account - Balances												
Current date (01/08/2012 16:38:10)												
Navigation												
Segment		Currency Type: Document currency										
Profit Center		Currency: US Dollar										
Business Area												
Functional Area												
		Number format...										
Account		Balance Car	Balance previous pe	Cumulated B Previous Pe	Debit Total Per. 1- 12	Credit Total Per. 1-	Cumulated Debit Bal	Cumulated Credit Bal	Accumulated Balance			
#Raw Material Consumption Expense		0.00	0.00	0.00	8,810.00	0.00	8,810.00	0.00	8,810.00			
#Result		0.00	0.00	0.00	8,810.00	0.00	8,810.00	0.00	8,810.00			

Figure 5-15 G/L (general ledger) account balance for raw material consumption

# Financial Transparency (cont'd.)

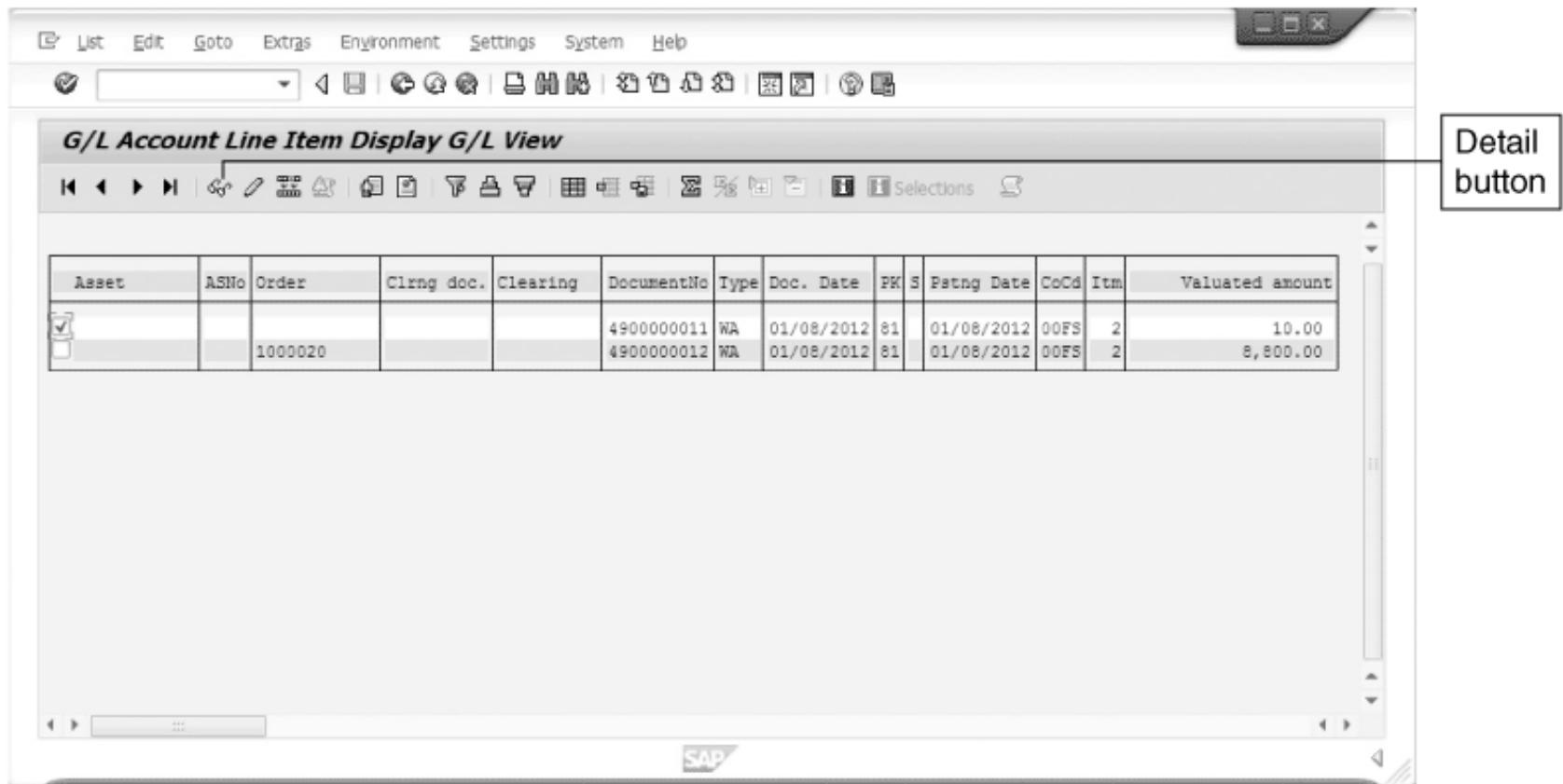


Figure 5-16 Documents that make up G/L account balance for raw material consumption

# Financial Transparency (cont'd.)

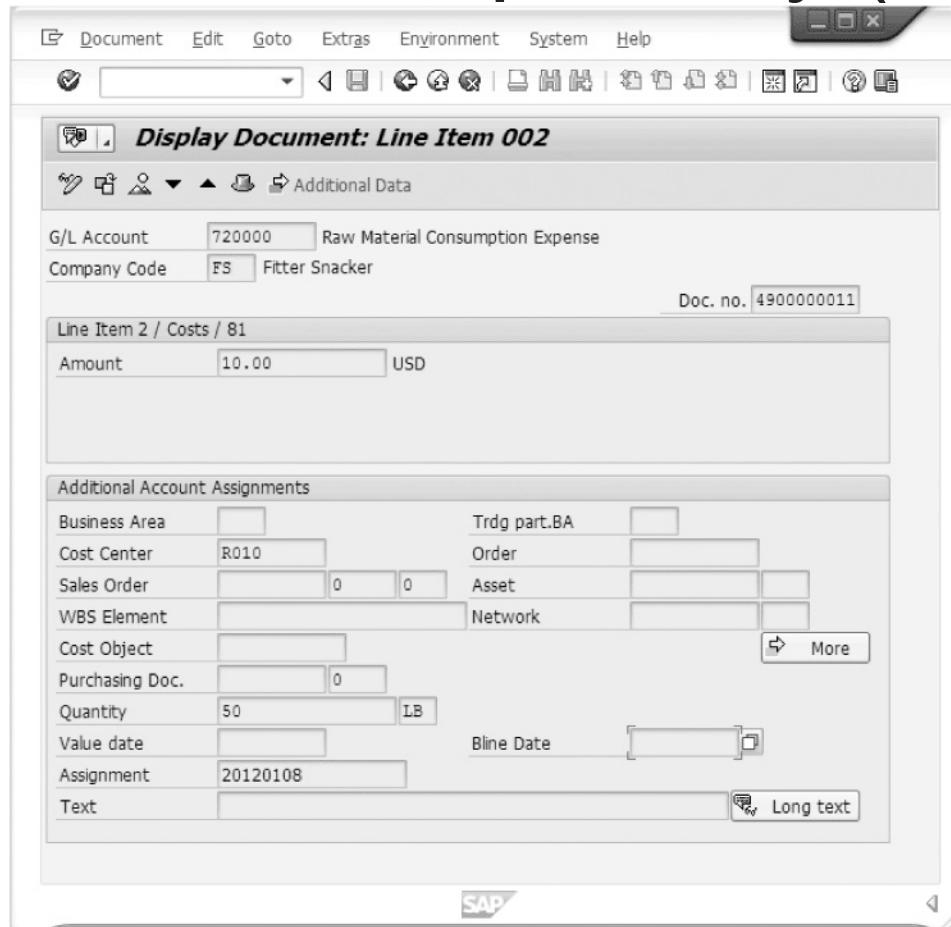


Figure 5-17 Details on \$10.00 line item in G/L account for raw material consumption

# Trends in Financial Reporting (XBRL)

- Extensible Business Reporting Language (XBRL)
  - Standards based language
  - Extensible Markup Language (XML) coded data directly from web page into database
  - Reports processed faster and validated easier
  - ERP systems accept data in XML and XBRL

# Summary

- Companies need accounting systems to record transactions and generate financial statements
- Unintegrated information systems
  - Accounting data might not be current
    - Can cause problems for sales representatives trying to make operational decisions
  - Data can be inaccurate
    - Can affect decision making and therefore profitability

# Summary (cont'd.)

- Closing the books at the end of an accounting period can be difficult with an unintegrated IS, but is relatively easy with an integrated IS
  - Closing the books means zeroing out temporary accounts
- Using an integrated IS and a common database to record accounting data has important inventory cost-accounting benefits
  - Can lead to more accurate product cost calculations
  - Can help managers determine which products are profitable and which are not

# Summary (cont'd.)

- Use of an integrated system and a common database to record accounting data has important management-reporting benefits
  - Built-in drill-down and query tools available
- Sarbanes-Oxley Act, 2002 U.S. federal regulation
  - Written and passed in the wake of Enron collapse
  - Promoted management accountability by requiring extra financial approval and reporting
  - ERP systems can help companies meet the requirements of this legislation

# Summary (cont'd.)

- Trends in financial reporting
  - XBRL
  - XML
  - ERP systems accept data in XML and XBRL into database



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Six*

*Human Resources Processes with  
ERP*

# Policies for students

- These contents are only used for students PERSONALLY.
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# Objectives

After completing this chapter, you will be able to:

- Explain why the Human Resources function is critical to the success of a company
- Describe the key processes managed by a Human Resources department
- Describe how an integrated information system can support effective Human Resources processes

# Introduction

- **Human capital management (HCM)**: tasks associated with managing a company's workforce
- Human Resources (HR) department responsibilities
  - Attracting, selecting, and hiring new employees
  - Communicating information regarding new positions and hires
  - Ensuring proper education, training, and certification for employees
  - Handling issues related to employee conduct
  - Making sure employees understand job responsibilities

# Introduction (cont'd.)

- Human Resources (HR) department responsibilities (cont'd.)
  - Using effective process to review employee performance and determine salary increases and bonuses
  - Managing salary and benefits for each employee
  - Communicating changes in salaries, benefits, or policies to employees
  - Supporting management plans for changes in the organization

# Problems with Fitter Snacker's Human Resources Processes

- Personnel management relies on paper records and a manual filing system
  - Creates problems
  - Information is not readily accessible or easy to analyze

# Recruiting Process

- Fitter Snacker (FS) has three employees in its HR department
- Problems occur because of:
  - Large number of HR processes (from hiring and firing to managing health benefits)
  - Lack of integration among all departments
  - Number of people with whom HR interacts
  - Inaccurate, out-of-date, and inconsistent information

# Recruiting Process (cont'd.)

- Problems that can arise in the recruiting process:
  - Description of qualifications required for the job may be incomplete or inaccurate
  - Job vacancy form may be lost or not routed properly
    - Human Resources department will not know that the position is available
    - Supervisor will assume that paperwork is in process
- Filing and properly keeping track of resumes and applications is a challenge at Fitter Snacker
  - Due to applicant's data being kept on paper form

# The Interviewing and Hiring Process

- At FS, requesting department develops a short list of candidates based on data provided by HR
- Human Resources department:
  - Contacts candidates on the short list
  - Schedules interviews
  - Creates a file for each candidate
- If a candidate accepts an interview offer, HR makes arrangements for the interview
  - After the initial interview, HR updates candidate's file to indicate whether he or she is a possibility for hire

# The Interviewing and Hiring Process (cont'd.)

- Second interview may be scheduled
- HR representative and supervisor of requesting department decide which candidates are acceptable and rank them
- HR person makes the highest-ranking candidate a job offer
- Acceptance of job offer by candidate

# The Interviewing and Hiring Process (cont'd.)

- Many of Fitter Snacker's problems in interviewing and hiring process deal with information flow and communication
- After candidate accepts formal job offer, Fitter Snacker hires an HR consulting firm to perform a background check
- Fitter Snacker frequently has problems enrolling new employees in correct benefits plans and establishing proper payroll deductions

# Human Resources Duties after Hiring

- HR department should maintain good, continual communication with employee and supervisor to make sure the employee is performing well
- Fitter Snacker issues performance evaluations to new and current employees
  - Evaluation documents become part of employee's file; maintained by HR department

# Human Resources Duties after Hiring (cont'd.)

- Not having an effective information system makes it difficult for Fitter Snacker:
  - To manage all of the performance evaluation data
  - For HR department to identify problems with an employee and take corrective action
  - To maintain proper control of sensitive personal information

# Human Resources Duties after Hiring (cont'd.)

- Employee turnover can be a significant problem
  - Costs related to hiring and training new employees
  - Companies lose knowledge and skills that may be crucial to keeping them competitive
  - Employee turnover is strongly related to job satisfaction and compensation

# Human Resources with ERP Software

The screenshot shows the SAP HR software interface titled "Display Personal Data". The top menu bar includes "InfoType", "Edit", "Goto", "Extras", "System", and "Help". Below the menu is a toolbar with various icons. The main area has a title "Display Personal Data" and a sub-header "Personnel No: 6". On the left, there is a "Find by" sidebar with a "Person" section containing "Collective search help", "Search Term", and "Free search". The main content area is divided into several sections:

- Personnel Info:** Personnel No: 6, Name: Ms Shae..., Status: Active, EE group: 1, Active, Personnel category: FS, Fit for Snacker Personnel, EE subgroup: AH, Salaried employees, SSN: 363-18-4021, Start: 08/13/1998, To: 12/31/9999, Changed on: 11/14/2011, BRET.
- Name:** Title: Ms, Last name: Heusinkveld, First name: Shaelee, Middle name: , Initials: SMH, Designation: , Suffix: 6, Name: Ms Shaelee Heusinkveld.
- HR Data:** SSN: 363-18-4021, Date of Birth: 03/18/1968, Language: English, Nationality: American US, Marital Status: Single, Gender: Female (radio button selected).

Figure 6-1 Personal data stored in SAP Human Resources software

# Human Resources with ERP Software

- A good information system allows all relevant information for an employee to be retrieved in a matter of seconds
- SAP ERP Human Resources (HR) module provides tools for:
  - Managing an organization's roles and responsibilities
  - Definitions
  - Personal employee information
  - Tasks related to time management, payroll, travel management, and employee training

# Human Resources with ERP Software (cont'd.)

- SAP ERP's Organization and Staffing Plan tool used to define:
  - Company's management structure
  - Positions within the organizational structure
- SAP ERP distinguishes between **task, job, position, and person**
- Manager's Desktop tool within SAP HR module
  - Provides access to all Human Resources data and transactions in one location

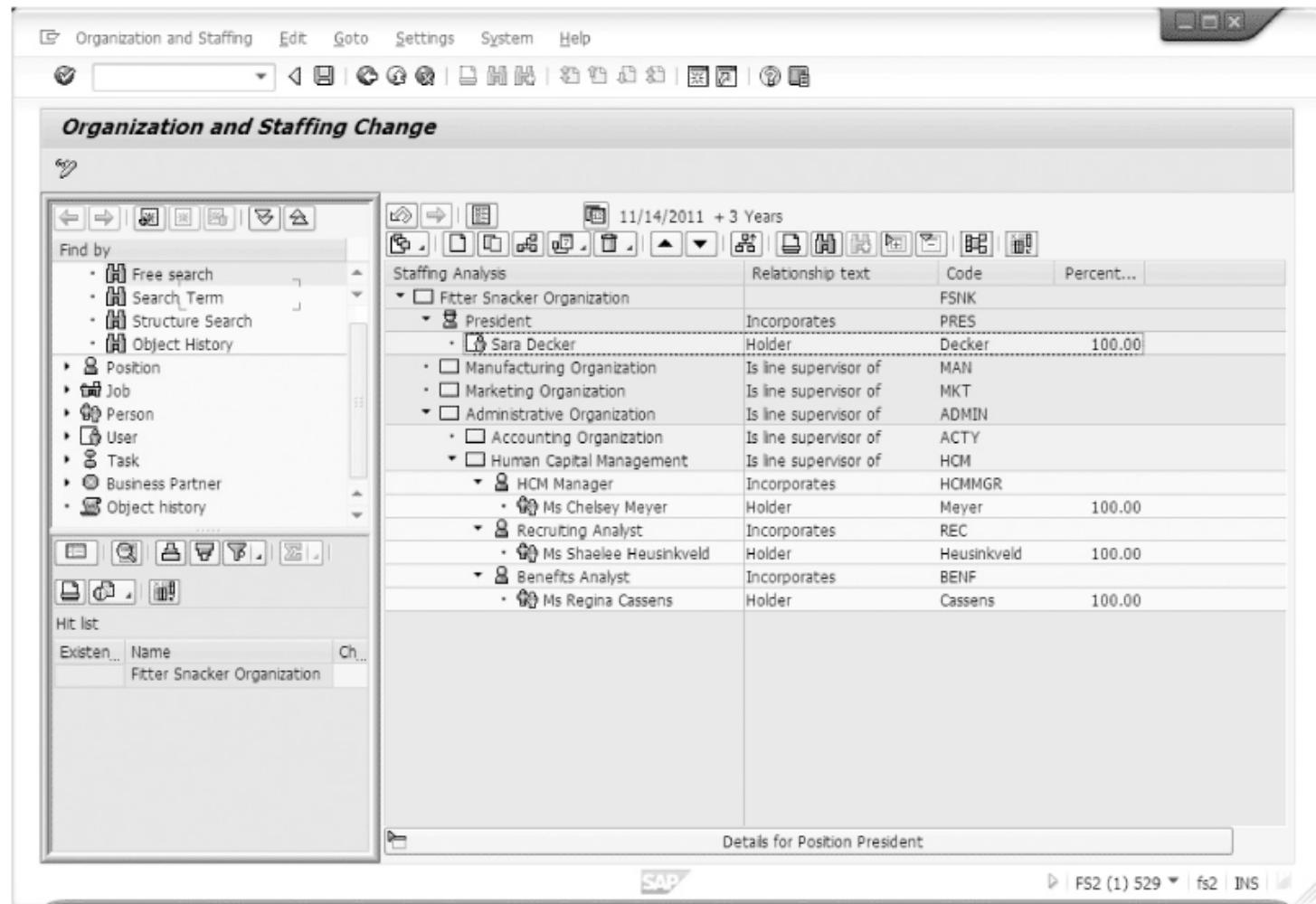


Figure 6-2 Organization and staffing plan in SAP ERP

# Human Resources with ERP Software (cont'd.)



Figure 6-3 Relationships among positions, jobs, tasks, and persons who fill positions

# Human Resources with ERP Software (cont'd.)

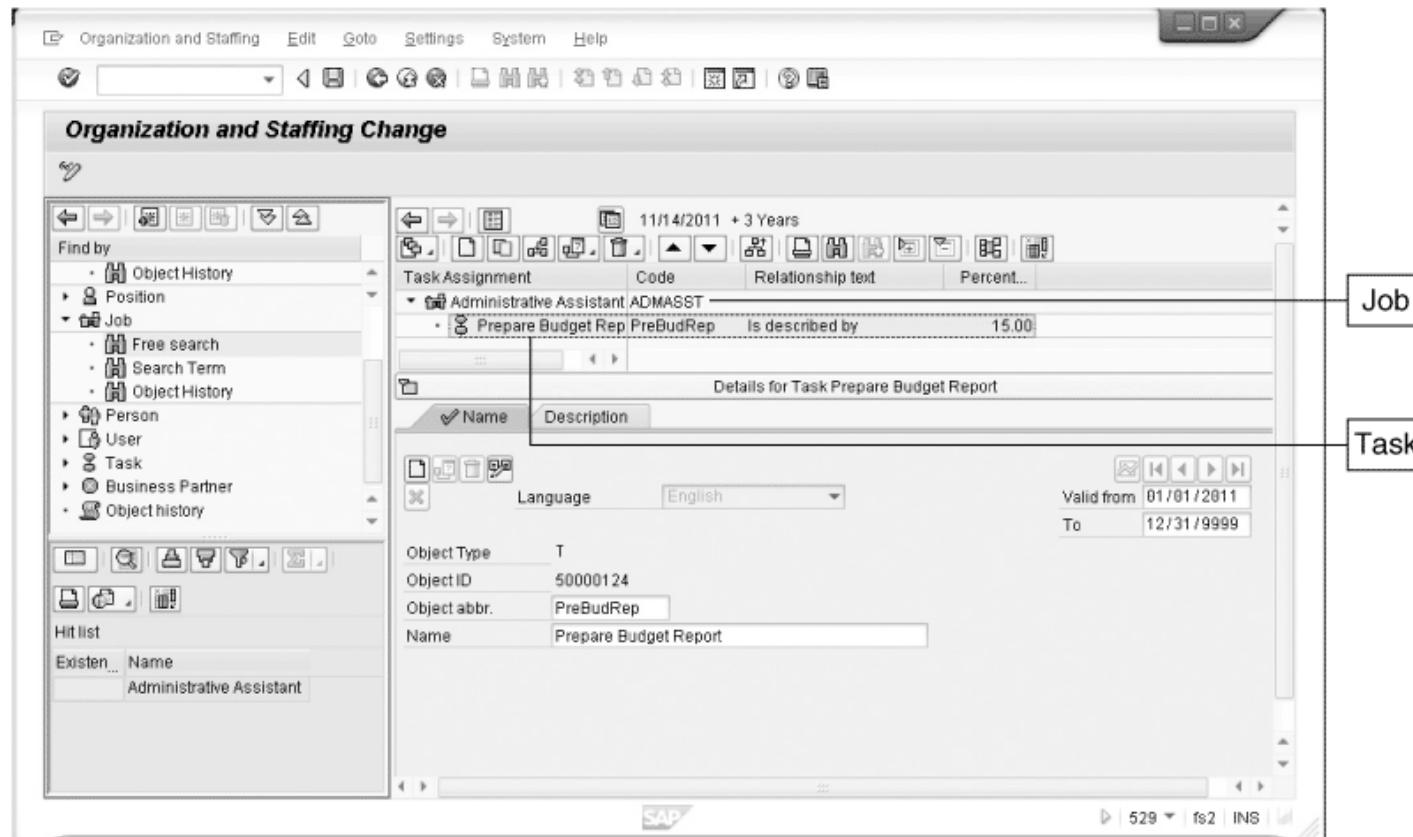


Figure 6-4 Assignment of a task to a job in SAP ERP

# Human Resources with ERP Software (cont'd.)

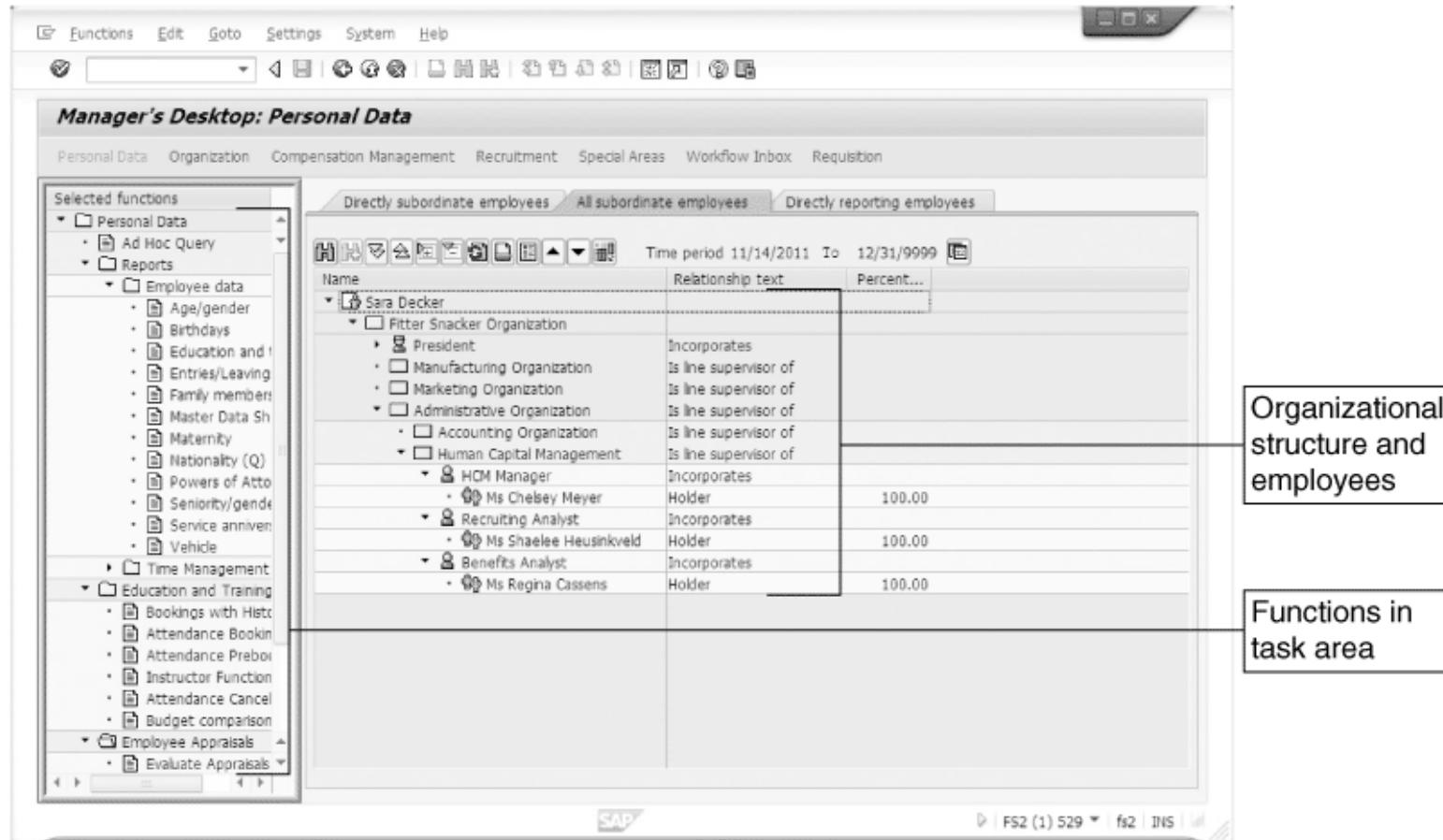


Figure 6-5 Manager's Desktop provides single-point access to HR functions

# Advanced SAP ERP Human Resources Features

- Time management
- Payroll processing
- Travel management
- Training and development

# Time Management

- Hourly employees
  - Paid for each hour worked
  - Must record time that they work
- Salaried employees
  - Not paid based on hours worked
  - Their time worked usually must be tracked as well

# Time Management (cont'd.)

- SAP ERP system uses Cross Application Time Sheets (CATS) to:
  - Record employee working times
  - Provide the data to applications including:
    - SAP Controlling module
    - SAP Payroll module
    - SAP Production Planning module

# Payroll

- **Remuneration elements** of an employee's pay
  - Base pay, bonuses, gratuities, overtime, sick pay, and vacation allowances
- **Statutory and voluntary deductions**
  - Taxes (federal, state, local, Social Security, and Medicare), company loans, and benefit contributions
- **Payroll run:** process of determining each employee's pay
  - SAP ERP system evaluates input data and notes any discrepancies in **error log**

# Travel Management

- Travel request may originate with employee or employee's manager
- Travel requests usually require management approval
- Once travel request is approved, travel reservations must be made

# Travel Management (cont'd.)

- SAP ERP Travel Management system
  - Maintains travel data for each employee, including flight, hotel, and car preferences
  - Integrates travel data with:
    - Payroll module for reimbursements
    - Financial Accounting and Controlling modules to properly record travel expenses

# Training and Development

- In SAP ERP system, employee development is driven by qualifications and requirements
  - **Requirements:** skills or abilities associated with a position
  - **Qualifications:** skills or abilities associated with a specific employee
- One of the most important reasons for managing the development and training of employees is **succession planning**

# Training and Development (cont'd.)

- Succession plan outlines strategy for replacing key employees when they leave the company
- Career and Succession Planning components of SAP ERP Human Resources module
  - Allow HR professionals to create, implement, and evaluate succession planning scenarios

# Additional Human Resources Features of SAP ERP

- Mobile time management
- Management of family and medical leave
- Domestic partner handling
- Administration of long-term incentives
- Personnel cost planning
- Management and payroll for global employees
- Management by objectives

# Mobile Time Management

- Many employees may not have regular access to a PC
- Mobile Time Management allows employees to use cellular phones to:
  - Record their working times
  - Record absences
  - Enter a leave request
  - Check their time charge data

# Management of Family and Medical Leave

- Human Resources module reduces administrative burden imposed by Family and Medical Leave Act (FMLA) of 1993
- HR system can:
  - Determine whether an employee is eligible to take FMLA absences
  - Automatically deducts those absences from the days the employee takes from allowable leave

# Domestic Partner Handling

- Human Resources module now supports the management of benefits for domestic partners and their children
- Provides more flexibility in:
  - Customizing dependent coverage options for health plans
  - Eligibility for enrollment of dependents
  - Designation of beneficiaries

# Administration of Long-Term Incentives

- Companies must account for expected costs that occur as a result of long-term incentives such as the exercising of stock options
- Human Resources module now provides more options for processing long-term incentives
  - Integration with SAP Payroll module
    - Can calculate taxes accurately when employees exercise incentives and sell their shares in the company
  - SAP can share incentive data with Accounting

# Personnel Cost Planning

- Personnel Cost Planning tool
  - Allows HR personnel to define and evaluate planning scenarios to generate cost estimates
- Performing cost planning and simulation
  - Allows HR to forecast cost estimates by integrating data with other SAP ERP modules

# Management and Payroll for Global Employees

- Management of global employees involves many complicated issues
  - Relocation plans, visas and work permits, housing, taxes, bonus pay
- SAP ERP has enhanced features to support the management of these issues
  - Customized functionality for more than 50 countries

# Management by Objectives

- Management by objectives (MBO)
  - 1954: first outlined by Peter Drucker in *The Practice of Management*
  - Managers encouraged to focus on results, not activities, and to “negotiate a contract of goals” with their subordinates without dictating the exact methods for achieving them

# Management by Objectives (cont'd.)

- SAP ERP provides a comprehensive process to support the MBO approach
  - Performance appraisals
    - Appraisal results can affect employee's compensation
  - Managers can include results of achieved objectives in the employee's qualifications profile

# Summary

- Employees are among a company's most important assets
  - Without qualified and motivated employees, a company cannot succeed
- Human Resources department responsible for:
  - Ensuring that the company can find, evaluate, hire, develop, evaluate, and compensate the right employees to achieve the company's goals
  - Employee training and development, succession planning, and termination

# Summary (cont'd.)

- Managing, sharing, controlling, and evaluating the data required to manage a company's human capital are simplified by an integrated information system
- Additional features of SAP HR systems address today's changing technology and legislation



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Seven*  
*Process Modeling, Process  
Improvement, and ERP  
Implementation*

# Policies for students

- These contents are only used for students PERSONALLY.
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# Objectives

After completing this chapter, you will be able to:

- Use basic flowcharting techniques to map a business process
- Develop an event process chain (EPC) diagram of a basic business process
- Evaluate the value added by each step in a business process

# Objectives (cont'd.)

- Develop process improvement suggestions
- Discuss the key issues in managing an ERP implementation project
- Describe some of the key tools used in managing an ERP implementation project

# Introduction

- Tools that can be used to describe business processes
  - Flowcharts, event process chains
  - Not specific to ERP
  - Can help managers identify process elements that can be improved
- Role of process-modeling tools in ERP implementation projects

# Process Modeling

- Business processes can be quite complex
- **Process model:** any abstract representation of a process
- Process-modeling tools provide a way to describe a business process so that all participants can understand the process

# Process Modeling (cont'd.)

- Advantages of process models
  - Graphical representations are usually easier to understand than written descriptions
  - Provide a good starting point for analyzing a process
    - Participants can design and implement improvements
  - Document the business process
    - Easier to train employees to support the business process

# Flowcharting Process Models

- **Flowchart**
  - Any graphical representation of the movement or flow of concrete or abstract items
  - Clear, graphical representation of a process from beginning to end
  - Uses a standardized set of symbols
- **Process mapping**
  - Often used interchangeably with flowcharting
  - Specifically refers to activities occurring within an *existing* business process

# Flowcharting Process Models (cont'd.)

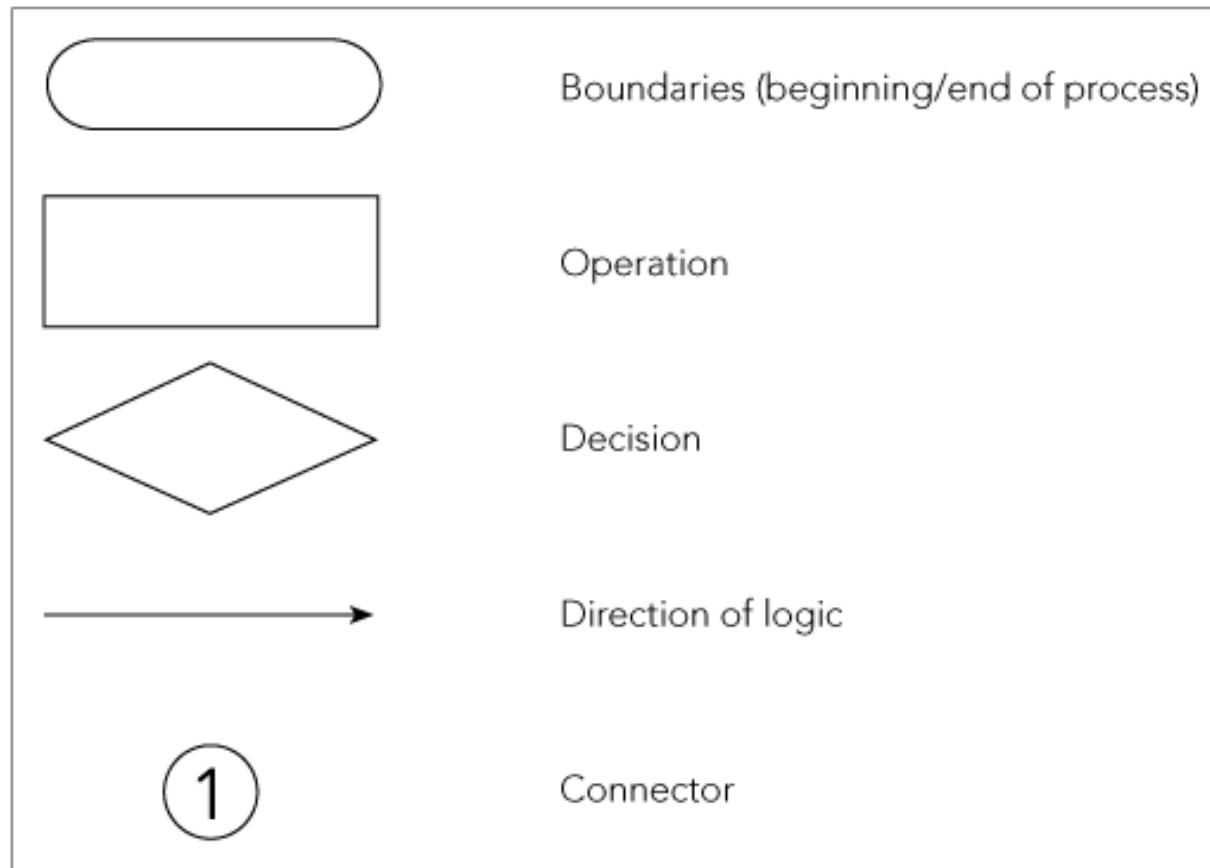
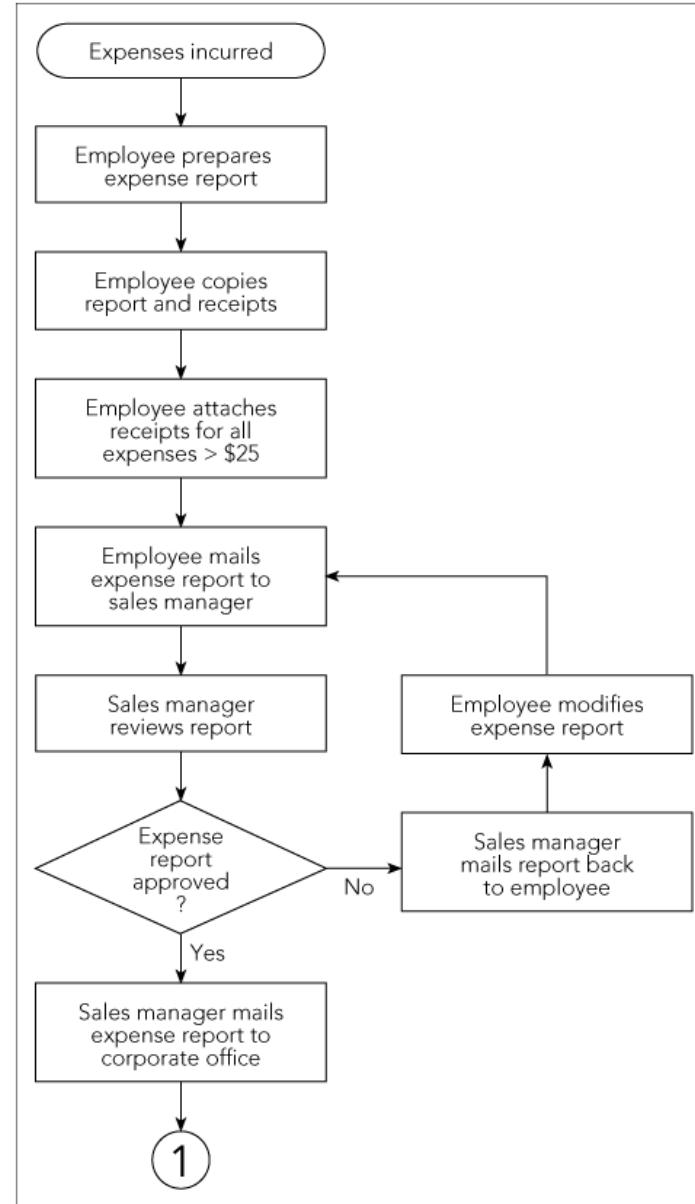


Figure 7-1 Basic flowcharting symbols

# Fitter Snacker Expense Report Process

- Maria, Fitter Snacker salesperson
  - Completes a paper expense report after travel
  - Makes a copy for her records
  - Attaches receipts for any expenses over \$25
  - Mails it to her zone manager at the branch office
- Kevin, zone manager
  - Reviews expense report
  - Approves report or mails it back to Maria asking for explanation, verification, or modification
  - After approval, mails it to corporate office

Figure 7-2 Partial process map for Fitter Snacker expense-reporting process



# Fitter Snacker Expense Report Process (cont'd.)

- Process at corporate office
  - Accounts payable (A/P) clerk
- **Process boundaries** define:
  - Which activities are to be included in the process
  - Which activities are considered part of environment—external to process
- All processes should have only one beginning point and one ending point
- Decision diamond asks a question that can be answered with “yes” or “no”

# Extensions of Process Mapping

- **Hierarchical modeling:** ability to flexibly describe a business process in greater or less detail, depending on the task at hand
- Modeling software that supports hierarchical modeling
  - Provides user the flexibility to move easily from higher-level, less detailed views to the lower-level, more detailed views

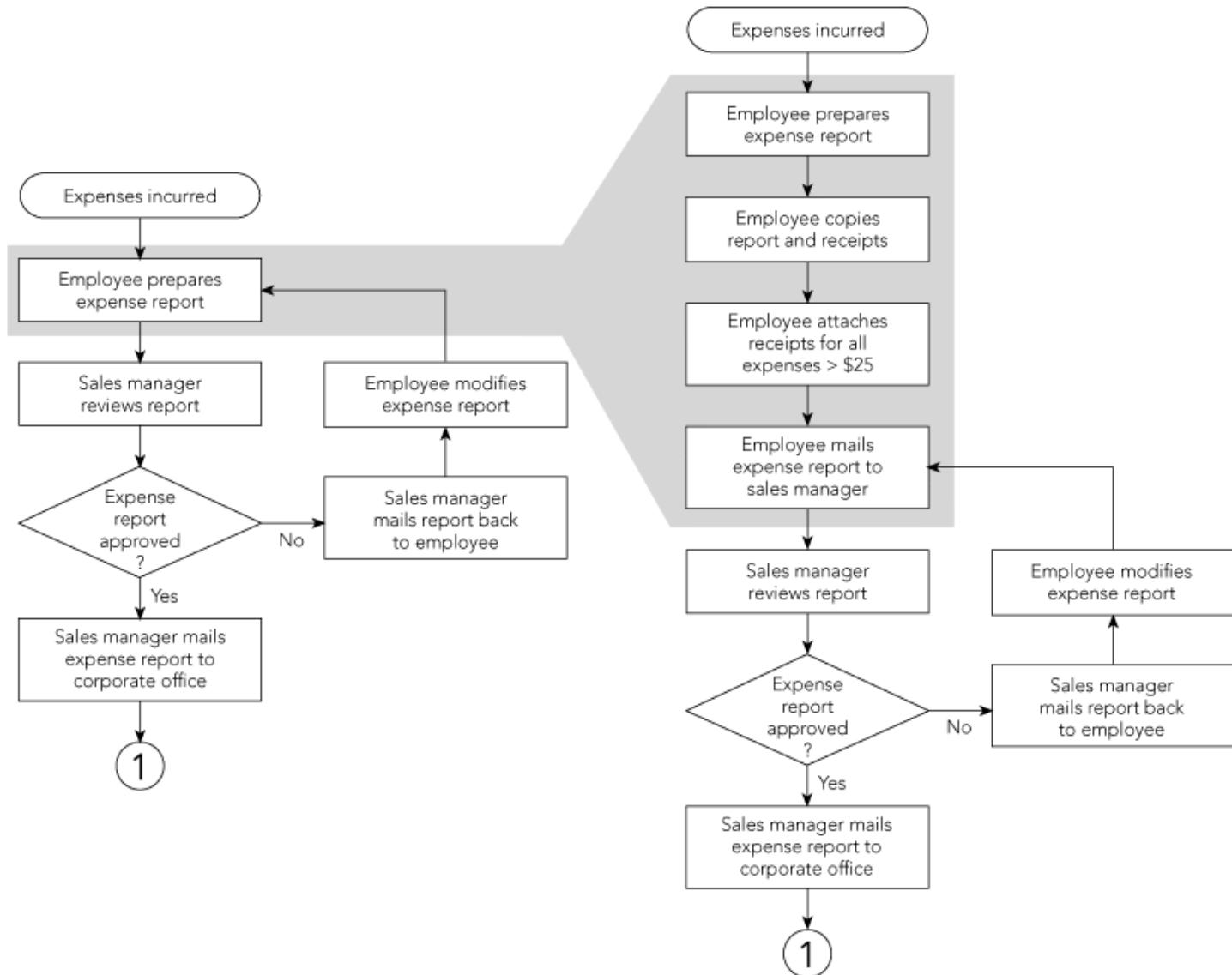


Figure 7-3 Hierarchical modeling of Fitter's expense-reporting process

# Extensions of Process Mapping (cont'd.)

- **Deployment flowcharting**
  - **Swimlane flowchart**
  - Depicts team members across the top
  - Each step is aligned vertically under the appropriate employee or team
  - Clearly identifies each person's tasks in the process

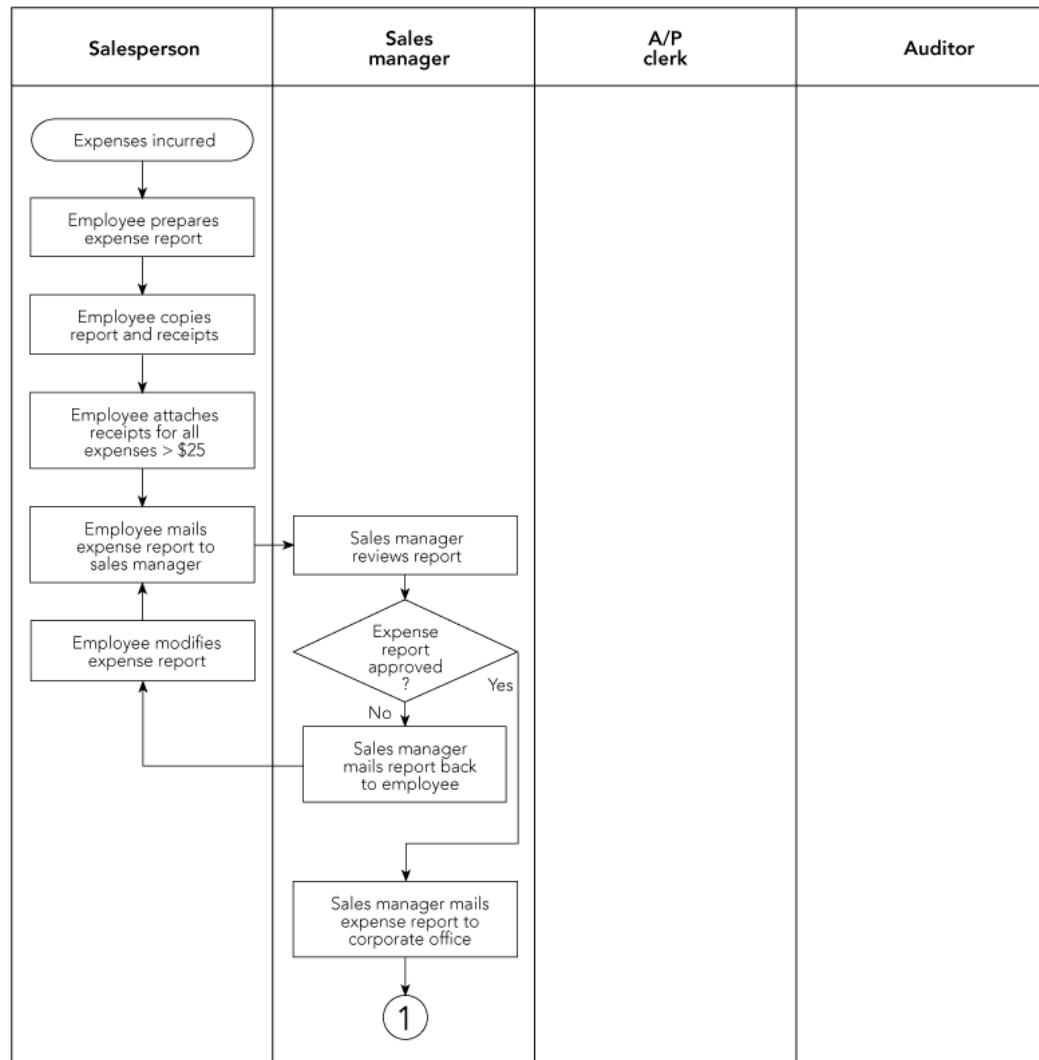


Figure 7-4 Deployment, or swimlane, flowcharting of the Fitter's expense report process

# Event Process Chain (EPC) Diagrams

- **Event process chain (EPC) format**
  - Uses only two symbols to represent a business process
  - Matches the logic and structure of SAP's ERP software design
  - Two structures: events and functions
    - Events: a state or status in the process
    - Functions: part of the process where change occurs

# Event Process Chain (EPC) Diagrams (cont'd.)

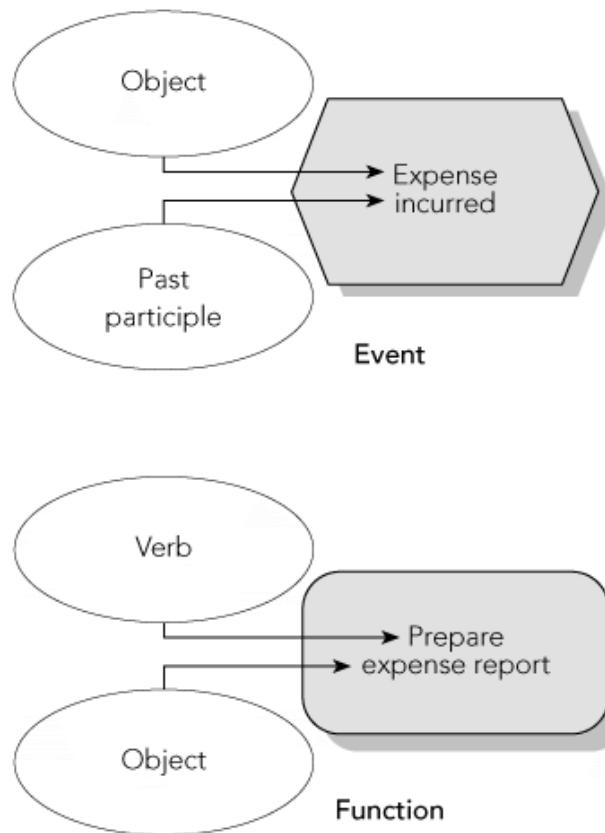


Figure 7-5 EPC components

# Event Process Chain (EPC) Diagrams (cont'd.)

- EPC software
  - Enforces an event-function-event structure
  - Standardized naming convention for functions and events
- Three types of branching connectors
  - AND
  - OR
  - Exclusive OR (XOR)
- Basic EPC diagram can be augmented with additional information

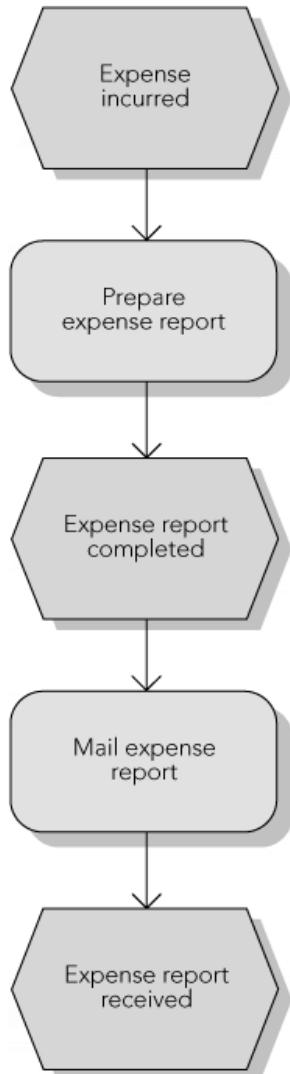


Figure 7-6 Basic EPC layout

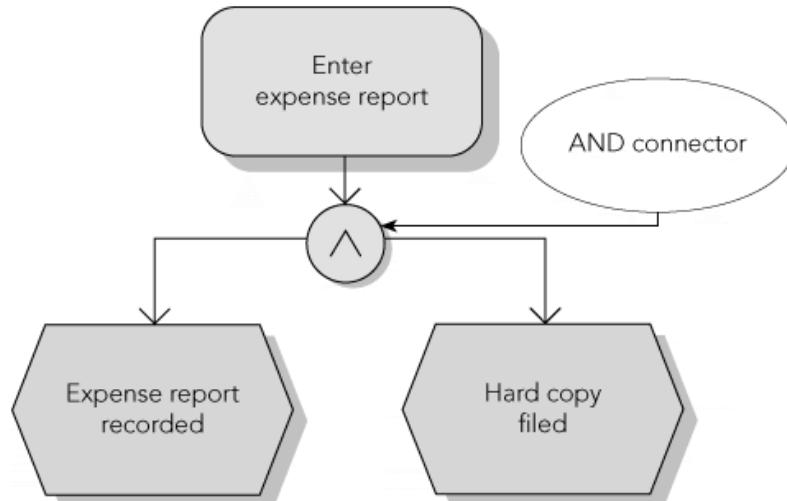


Figure 7-7 AND connector

# Event Process Chain (EPC) Diagrams (cont'd.)

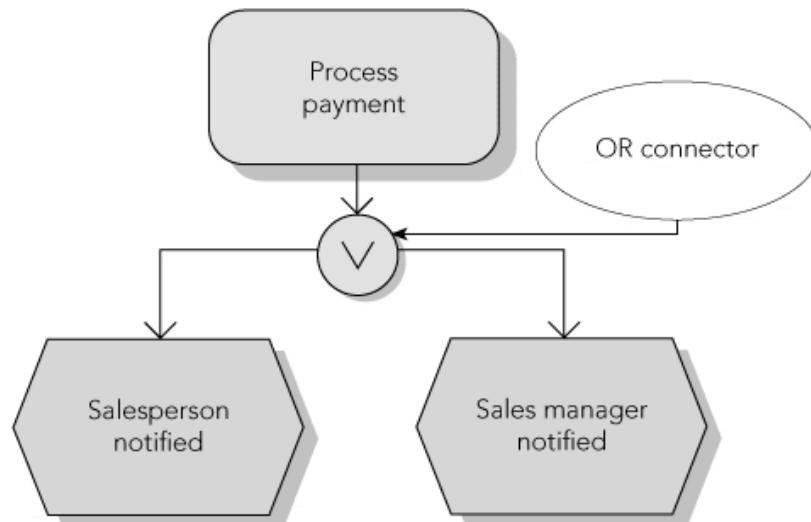


Figure 7-8 OR connector

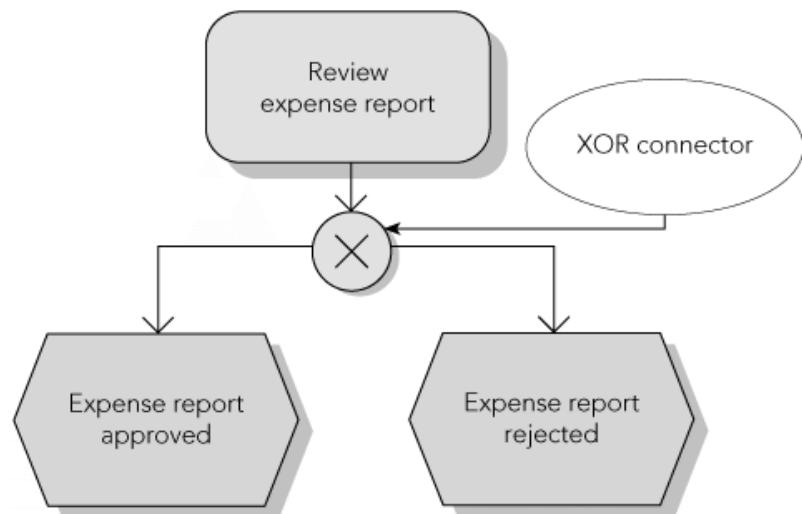


Figure 7-9 XOR connector

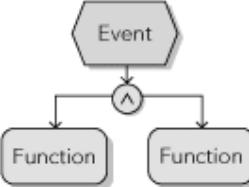
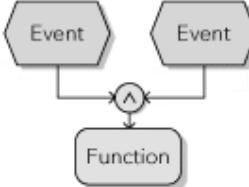
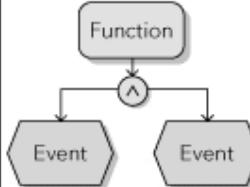
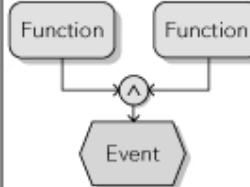
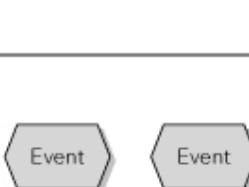
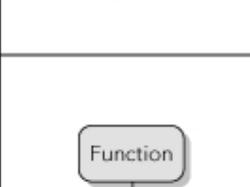
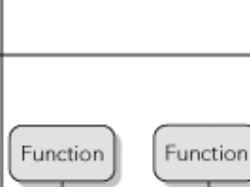
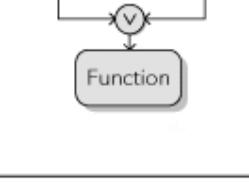
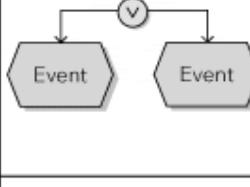
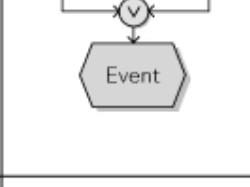
		Event trigger	Function trigger		
		Single	Multiple	Single	Multiple
AND	Event				
	Function				
XOR	Function				

Figure 7-11 Possible connector and triggering combinations

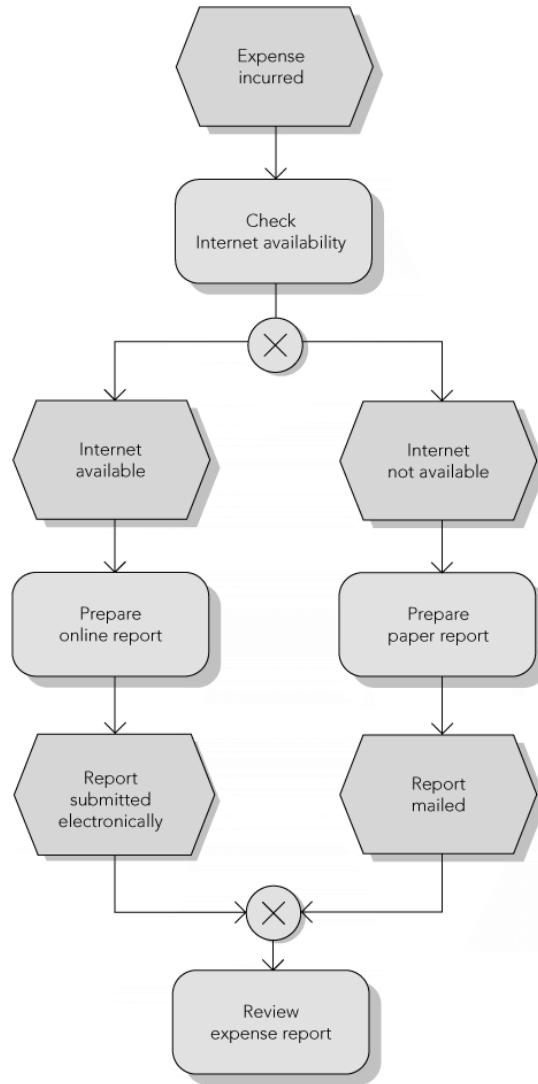


Figure 7-12 Splitting and consolidating paths

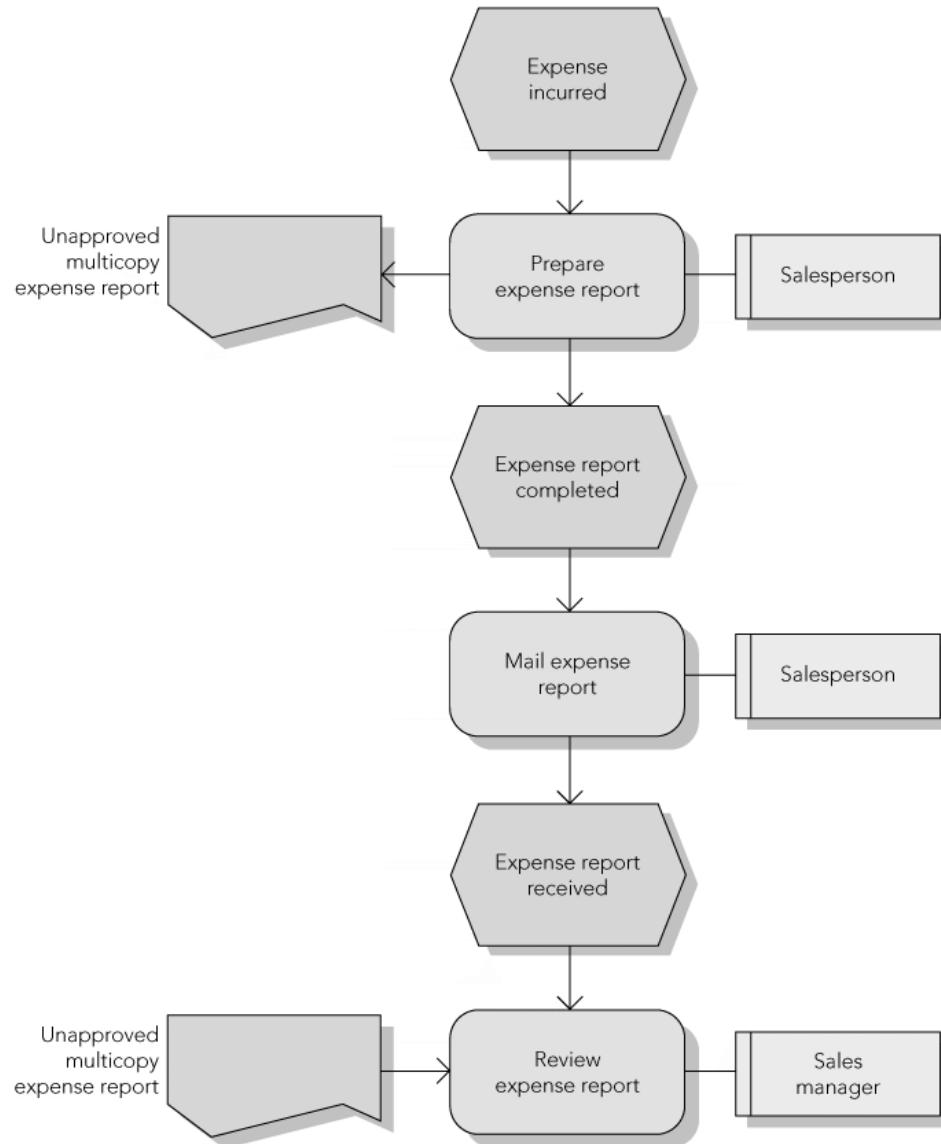


Figure 7-13 EPC diagram with organizational and data elements

# Process Improvement

- **Value analysis**
  - Each activity in the process is analyzed for the value it adds to the product or service
  - **Value added** is determined from the perspective of customer
  - *Real value*: value for which the customer is willing to pay
  - *Business value*: value that helps the company run its business
  - *No value*: an activity that should be eliminated

# Evaluating Process Improvement

- Disrupting the current process to make changes can be costly and time consuming
- **Dynamic process modeling** takes a basic process flowchart and puts it into motion
  - Uses computer simulation techniques to facilitate the evaluation of proposed process changes
- Computer simulation
  - Uses repeated generation of random variables that interact with a logical model of the process
  - Predict performance of the actual system

# ERP Workflow Tools

- **Workflow tools**
  - Software programs that automate the execution of business processes and address all aspects of a process, including:
    - Process flow (logical steps in the business process)
    - People involved (the organization)
    - Effects (the process information)
- ERP software provides a workflow management system
  - Supports and speeds up business processes

# ERP Workflow Tools (cont'd.)

- **Workflow tasks:** links that can include basic information, notes, documents, and direct links to business transactions
- SAP system can:
  - Monitor workflow tasks
  - Automatically take various actions if the tasks are not completed on time

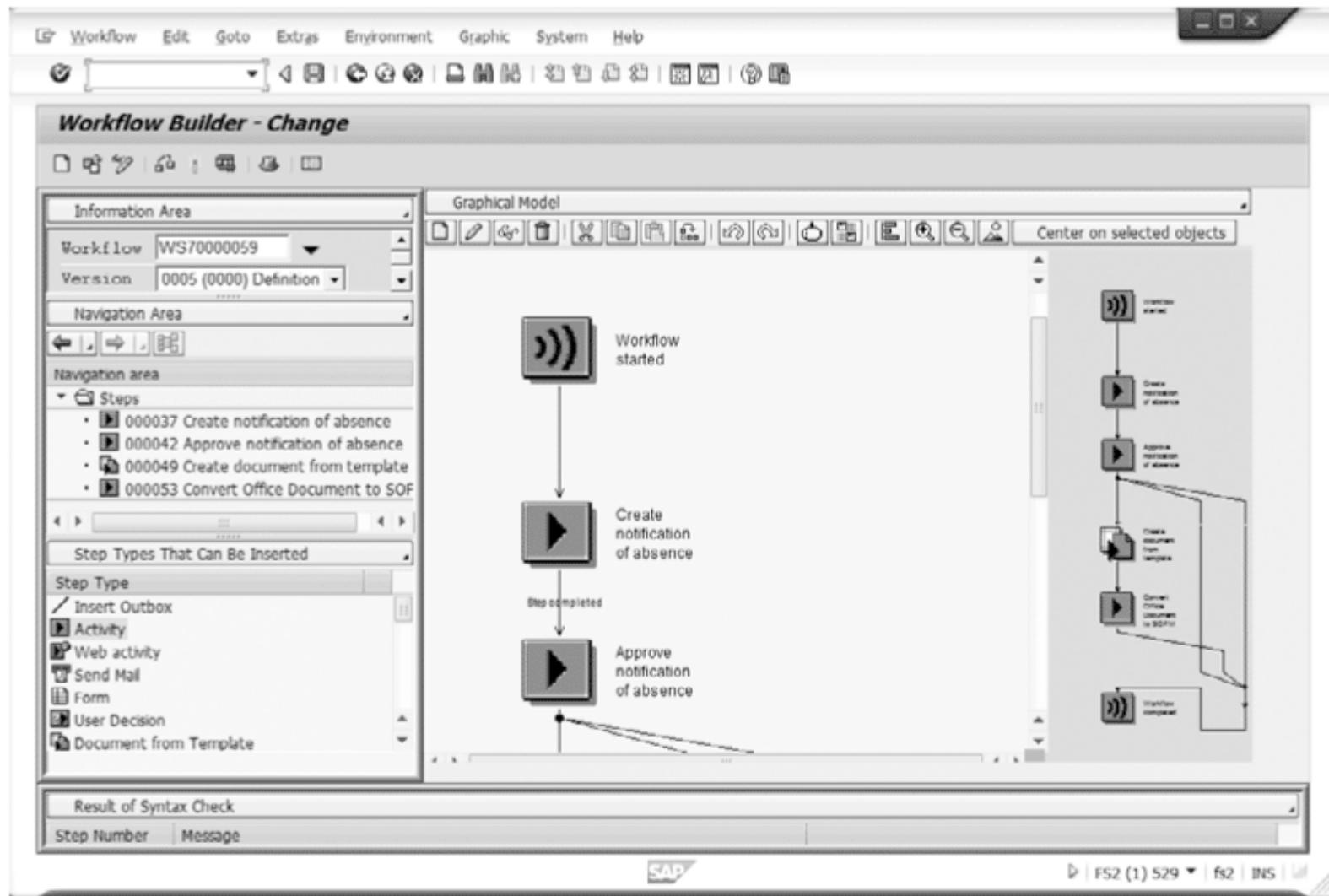


Figure 7-14 SAP ERP Workflow Builder screen

Form Edit Goto System Help

Create Notification of Absence

Application Data			
Number	87	Status	New
Personal Data			
Name	Regina Cassens		
Department	Human Resources		
Personnel no.	234586	Cost center	HR021
Absence Data			
By	to	Hours	Leave Type
Leave 1	12/14/2011	12/23/2011	Vacation
Leave 2			Vacation
Leave 3			Vacation
Reason	Family holiday vacation		
Contact at			
Entry and Approval			
Date	11/15/2011	Date	
Issuer	CASSENS	Approver	

Figure 7-15 Create notification of absence screen

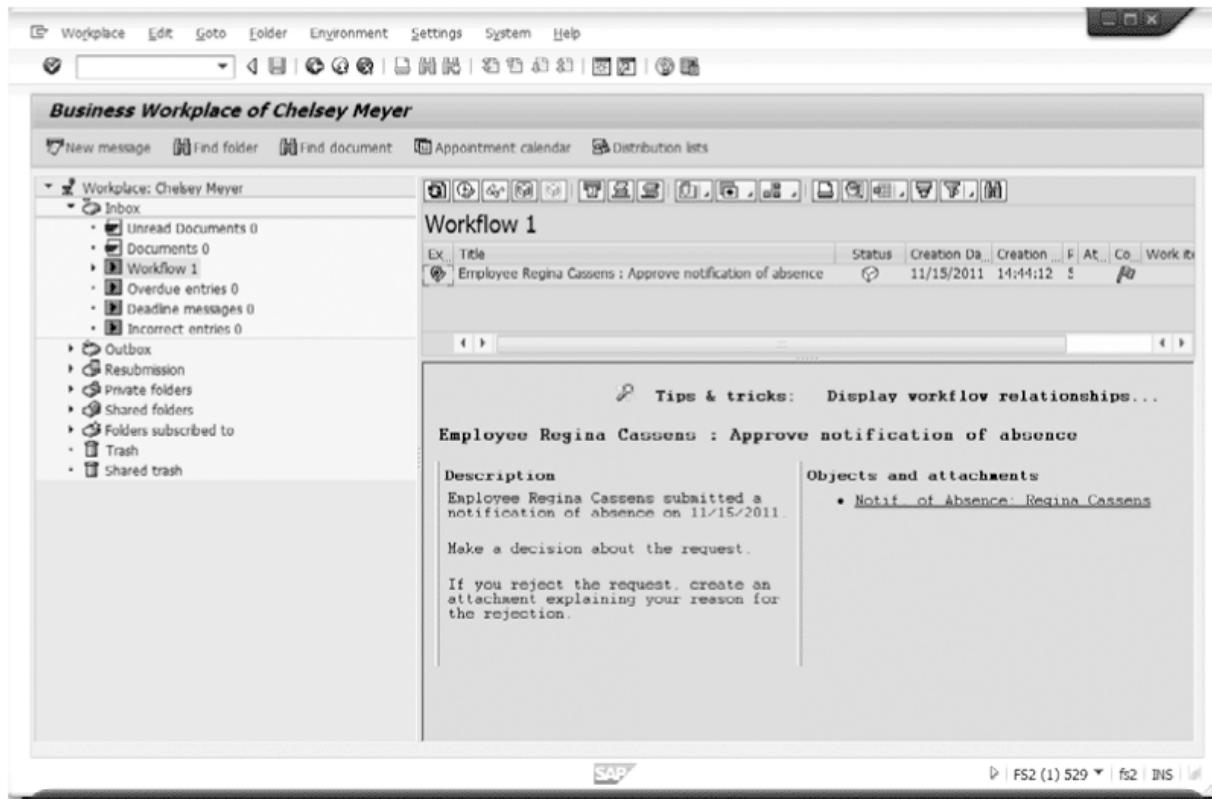


Figure 7-16 Manager's Business Workplace with workflow task

# ERP Workflow Tools (cont'd.)

- Workflow provides a number of useful features
  - Employees can track progress of workflow tasks
  - System can be programmed to send reminders to employee(s) responsible for a task
  - For sporadic processes, workflow tools are a powerful way to improve process efficiency and effectiveness

# Implementing ERP Systems

- Late 1990s: many firms rushed to implement ERP systems to avoid the Y2K problem
- Since 2000: pace of implementations has slowed considerably
  - Most Fortune 500 firms have implemented an ERP system
  - Current growth is in the small to midsized business market
- Implementation of ERP is an ongoing process

# ERP System Costs and Benefits

- ERP implementation is expensive
  - Usually ranging between \$10 million and \$500 million, depending on company size
- Costs of ERP implementation
  - Software licensing fees
  - Consulting fees
  - Project team member time
  - Employee training
  - Productivity losses

# ERP System Costs and Benefits (cont'd.)

- Companies must identify a significant financial benefit that will be generated by ERP system
- Only way companies can save money with ERP systems is by using them to support more efficient and effective business processes
- Companies must manage transfer of data from old computer systems to new ERP system

# Implementation and Change Management

- Key challenge is not in managing technology, but in managing people
- ERP system changes how people work
  - To be effective, change may have to be dramatic
  - Business processes that are more effective require fewer people
  - Some employees may be eliminated from their current jobs

# Implementation and Change Management (cont'd.)

- **Organizational change management (OCM):** managing the human behavior aspects of organizational change
- People do not mind change, they mind *being* changed
- If ERP implementation is a project that is being forced on employees, they will resist it
- When employees have contributed to a process change, they have a sense of ownership and will likely support the change

# Implementation Tools

- Many tools are available to help manage implementation projects
  - Example: process mapping
- SAP provides Solution Manager tool
  - Helps companies manage implementation of SAP ERP

# Implementation Tools (cont'd.)

- In Solution Manager, ERP implementation project is presented in a five-phase Implementation Roadmap:
  - Project Preparation (15 to 20 days)
  - Business Blueprint (25 to 40 days)
  - Realization (55 to 80 days)
  - Final Preparation (35 to 55 days)
  - Go Live and Support (20 to 24 days)

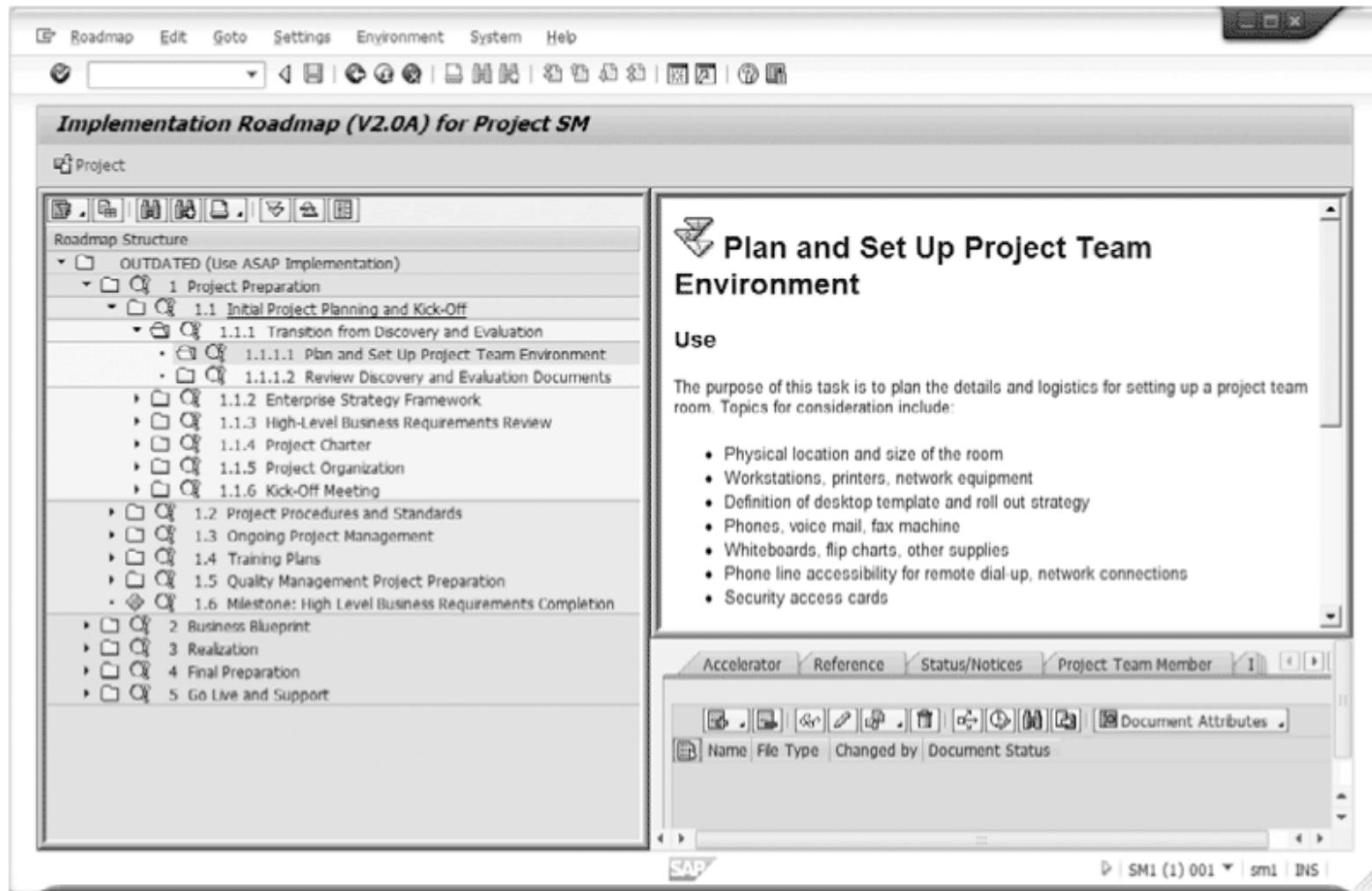


Figure 7-17 Implementation Roadmap in Solution Manager

# Implementation Tools (cont'd.)

- Project Preparation
  - Organizing technical team
  - Defining system landscape
  - Selecting hardware and database vendors
  - Defining project's scope
    - Scope creep
- Business Blueprint
  - Produces detailed documentation of business process requirements of the company

# Implementation Tools (cont'd.)

- Realization
  - Project team members work with consultants to configure the ERP software in development system
- Final Preparation
  - Testing the system throughput for critical business processes
  - Setting up help desk for end-users
  - Setting up operation of the Production (PROD) system and transferring data from legacy systems
  - Conducting end-user training
  - Setting Go Live date

# Implementation Tools (cont'd.)

- Go Live and Support
  - Company begins using new ERP system
  - Monitoring of system is critical so that changes can be made quickly if performance of the system is not satisfactory
  - Important to set a date at which the project will be complete

# System Landscape Concept

- SAP recommends a system landscape for implementation
  - Three completely separate SAP systems:
    - **Development (DEV)**
    - **Quality Assurance (QAS)**
    - **Production (PROD)**
  - **Transport directory:** special data file location on DEV server

# System Landscape Concept (cont'd.)

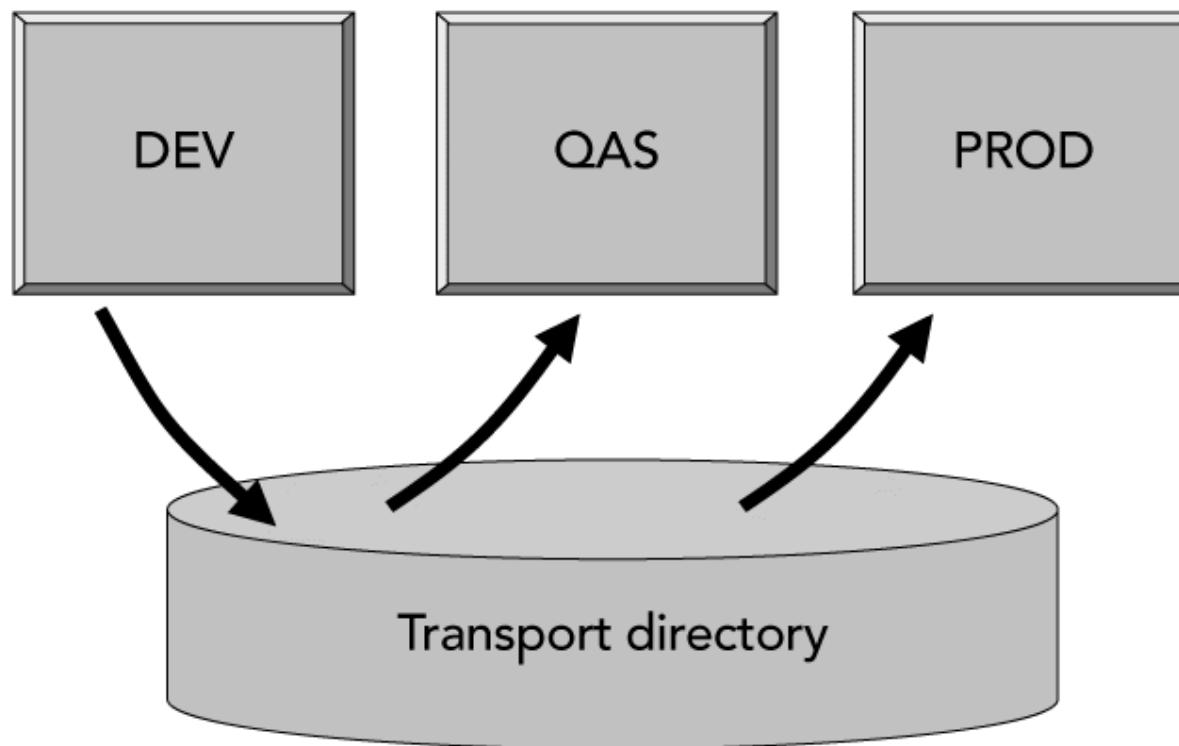


Figure 7-18 System landscape for SAP ERP implementation

# System Landscape Concept (cont'd.)

- Development (DEV) system used to develop configuration settings and special enhancements using ABAP code
- Changes recorded in transport directory
- Changes imported into QAS system
- QAS system: changes are tested
- All settings, programs, and changes that pass testing are transported to PROD system
- PROD system: used by company to run its business processes

# Summary

- Business processes
  - ERP systems are designed to provide the information, analysis tools, and communication abilities to support efficient and effective business processes
  - Process modeling: fundamental tool in understanding and analyzing business processes

# Summary (cont'd.)

- Process mapping: process-modeling tool that uses graphical symbols to document business processes
  - Other methodologies: hierarchical modeling, deployment flowcharting, event process chain diagramming, value analysis, and business process improvement
  - SAP's Solution Manager: set of tools and information that can be used to guide an implementation project
    - Included in SAP ERP to help manage the implementation of ERP software

# Summary (cont'd.)

- SAP's system landscape was introduced to show how changes to ERP system during implementation (and beyond) are managed
- Most challenges to ERP implementation involve managing personnel and their reactions to the change, rather than managing technical issues



# Concepts in Enterprise Resource Planning

*Fourth Edition*

*Chapter Eight*

*RFID, Business Intelligence (BI),  
Mobile Computing, and the Cloud*

# Policies for students

- These contents are only used for students PERSONALLY.
- Students are NOT allowed to modify or deliver these contents to anywhere or anyone for any purpose.

# Objectives

After completing this chapter, you will be able to:

- Define RFID and its role in logistics and sales
- Define business intelligence (BI), and provide examples of its uses
- Explain how in-memory computing will change the use of BI
- Discuss the importance of mobile applications to businesses
- Describe cloud computing and why it is becoming important for ERP providers

# Objectives (cont'd.)

- Explain how the service-oriented architecture (SOA) concept has changed ERP development
- Describe Web services, and outline the unique components of NetWeaver
- Define software as a service (SaaS), and identify the advantages and disadvantages of using this software delivery model

# Introduction

- An Enterprise Resource Planning (ERP) system allows a company to accomplish tasks that cannot be done well, if at all, without such a system
- Traditionally:
  - ERP systems have been software applications that are run on a company's own computer systems
  - Focus of ERP has been on managing business transactions

# Introduction (cont'd.)

- Technologies, such as radio frequency identification (RFID), are increasing the amount of data that is contained in ERP systems
- Business intelligence technologies are turning data in ERP systems into valuable information
- Cloud computing and mobile technologies are changing where ERP data is stored and how it is delivered

# Radio Frequency Identification (RFID) Technology

- **Radio frequency identification** technology
  - Known commonly as RFID
  - Becoming an increasingly efficient tool for tracking items through a supply chain
- **RFID device**
  - Can be attached to products
  - A small package (or tag) made up of a microprocessor and an antenna

# Radio Frequency Identification (RFID) Technology (cont'd.)

- RFID reader
  - Can determine location of an item with an RFID tag
  - Emits radio waves and receives signals back from the tag
  - Sometimes called an interrogator
- Advantages of RFID technology:
  - Does not need a line-of-sight connection
  - Can withstand most environmental stresses

# Radio Frequency Identification (RFID) Technology (cont'd.)

- Walmart is on the leading edge of the move to integrate RFID technology into the supply chain
- Pharmaceutical firms are evaluating the use of RFID technology
- RFID technology is being employed to track medical devices
  - Spectrum Health's Meijer Heart Center is using RFID technology to track stents

# Business Intelligence/Business Analytics

- **Business intelligence (BI)**
  - Also referred to as *business analytics*
  - A range of different applications and technologies used to extract and analyze large amounts of data to aid in decision making
  - Includes data-mining tools and querying tools
    - Often interactive and visual
- There has been significant growth in the BI market in recent years

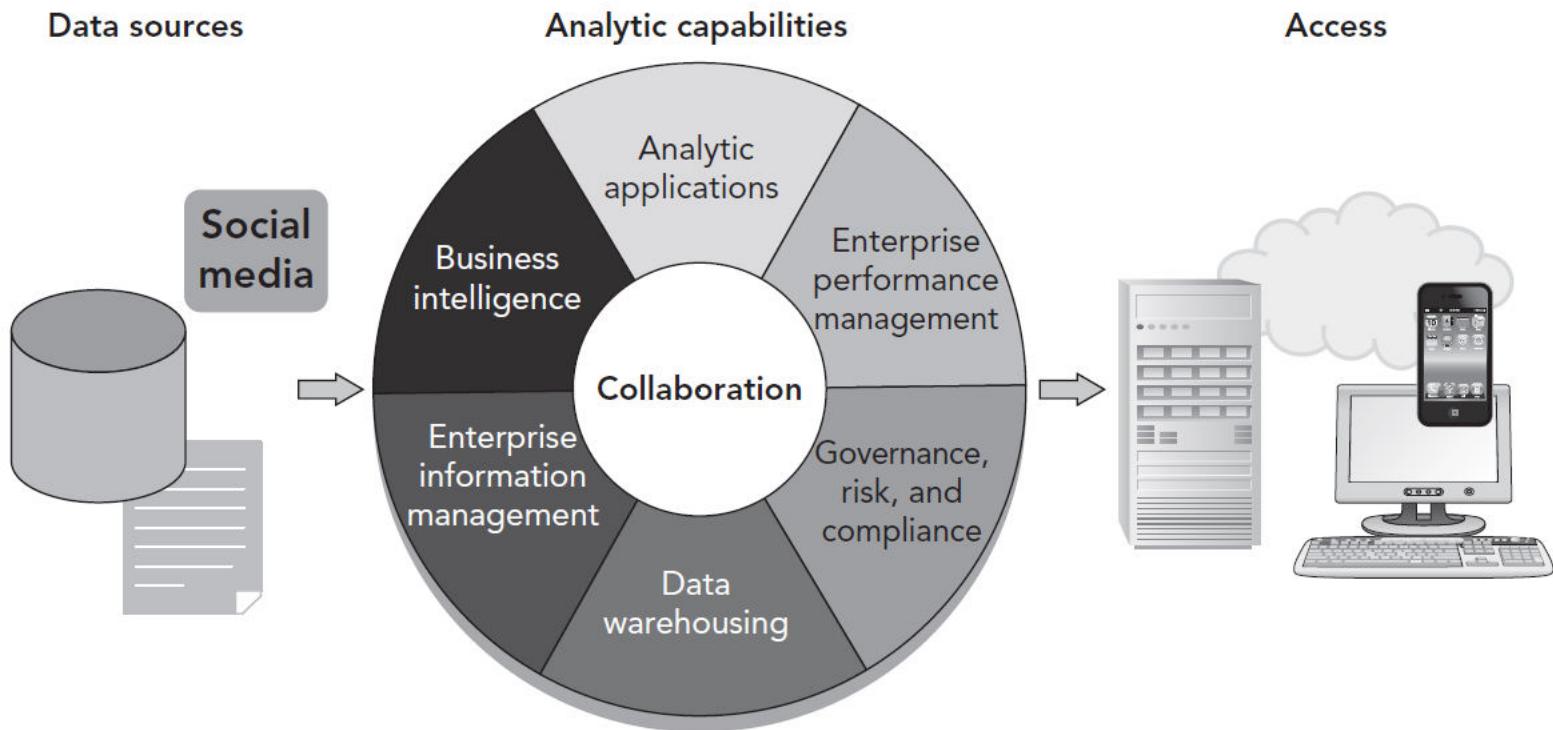


Figure 8-1 SAP Business Intelligence (BI) framework

# Business Intelligence/Business Analytics (cont'd.)

- Analytic applications and business intelligence
  - Similar sets of data analysis tools
- Analytic applications
  - Data analysis tools applied to specific industries
- Enterprise performance management
  - Concept of developing strategic goals for the organization
  - Gathering data to evaluate how the organization is performing in relation to those goals

# Business Intelligence/Business Analytics (cont'd.)

- Governance, risk, and compliance category
  - A group of activities focused on ensuring an organization is functioning ethically and legally
- Data warehousing
  - Technology used to store the large volumes of data used in the analysis
- **Enterprise information management**
  - Describes the business and technology functions that manage information as a corporate asset

# In-Memory Computing

- Data in a data warehouse are structured as **multidimensional data cubes**
  - Allow for relationships in the data to be analyzed quickly
- Two main challenges with using a multidimensional cube structure
  - A significant level of technical expertise is needed to construct a cube
  - A multidimensional cube necessarily restricts how the data can be analyzed

# In-Memory Computing (cont'd.)

- Accessing data from memory much faster than accessing data from a hard disk
- Reason why data warehouses use disk memory: storage capacity
  - Hard disks can store one thousand times more data than memory for a comparable cost
- Data compression provided by column storage
  - Makes it possible to store large volumes of data in memory without aggregation
  - Multidimensional cubes are not required

Data Browser: Table MARC Select Entries	200																									
4	CheckTable...																									
Tables:	MARC																									
Displayed Fields:	27 of 323 Fixed Columns																									
		LIN	WID	0250																						
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	204	00F110	00PT	LBG				00/00/0000									0	0	0	0.00						
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Many columns are blank or have zero values

Figure 8-2 Material master data table

# In-Memory Computing (cont'd.)

- Both SAP's and Oracle's in-memory solutions are designed to analyze "big data"
- Big data
  - Enormous amount of data that is now available for BI use from all the available sources, including:
    - ERP systems, Web sites, corporate databases, scientific research, Twitter, and other social networking applications
- BI analytics was the top technology priority for CIOs in 2012

# Mobile Computing

- Increasing use of smartphones, tablet computers, and other mobile computing devices
- Mobile applications need to be developed for different kinds of smartphones, with different operating systems
- Companies need to make many decisions about the use of mobile devices by employees
- Mobile devices provide users with information and can also be sources of information

# From Internet-Enabled to Cloud Computing

- Cloud computing
  - Delivery of a software product to a user via the Internet
  - The user typically accesses the cloud product through a Web browser or a lightweight (meaning small and simple) application for a computer or mobile device
- Cloud computing is not a completely new concept
  - It represents the latest stage of the development of computing and the Internet

# SAP and the Internet

- 1996: SAP introduced its joint Internet strategy with Microsoft
- Internet Transaction Server (ITS)
  - A server-based software system that enabled efficient communication between an SAP ERP system and the Internet
  - Core of SAP's first effort to integrate the Internet with its products

# SAP and the Internet (cont'd.)

- May 1999: SAP announced mySAP.com
  - A new strategy designed to completely realign the company and its product portfolio
  - Goal: combine e-commerce solutions with SAP's existing ERP applications, using cutting-edge Web technology
- 2000: SAP began building on the mySAP.com vision
  - Added the capability for electronic marketplaces and corporate portals

# NetWeaver

- 2004: SAP introduced its first version of SAP NetWeaver
  - A collection of components that support business transactions over the Internet
  - Provide seamless connectivity of diverse applications
- SAP's enterprise service-oriented architecture (enterprise SOA)
  - Goal of making all of its business applications service based

# NetWeaver (cont'd.)

- Web services
  - Combination of software tools that enables an organization's various systems and applications to communicate with other applications
- SAP's NetWeaver
  - A Web services platform that allows various vendor applications to share data over the Internet

# NetWeaver (cont'd.)

- One benefit of adopting SOA
  - Ability to quickly add new applications, making the organization more responsive
  - Use of open standards
- Implementing SOA is not easy
- Return on an SOA investment is often difficult to determine

# NetWeaver Tools and Capabilities

- SAP's NetWeaver platform is a collection of modules, including:
  - Enterprise Portal
  - Mobile Infrastructure
  - Business Intelligence
  - Master Data Management
  - Exchange Infrastructure

# NetWeaver Tools and Capabilities (cont'd.)

- SAP Enterprise Portal gives users complete access to all their work on a single screen
  - All information is available through the Web services provided by NetWeaver
- NetWeaver's Mobile Infrastructure module allows users to access and work with data through mobile devices such as smartphones and pagers

# NetWeaver Tools and Capabilities (cont'd.)

- Business Intelligence (BI) works with any database management software and any operating system that is running NetWeaver
- Master Data Management provides data consistency within a company's SAP system
- NetWeaver's Exchange Infrastructure module allows different applications to share data

# NetWeaver at Work for Fitter

- Examining how NetWeaver can help Fitter
- Fitter has an SAP ERP system
- Fitter's two top salespeople, Amy Sanchez and Donald Brown, are busy selling NRG bars directly to customers and to distributors

# SaaS: Software As A Service

- A software delivery model
- A software product is hosted by a company—such as SAP—on its servers and is accessed by customers via a Web browser
- Sometimes described as a utility
- A subset of cloud computing

# SAP Business ByDesign

- An example of SaaS for the ERP market
- First released in 2007
- A full ERP system delivered to customers via the cloud
- For small to medium-sized companies:
  - Lowers the total cost of ownership of the software
  - Enables a rapid and smooth implementation

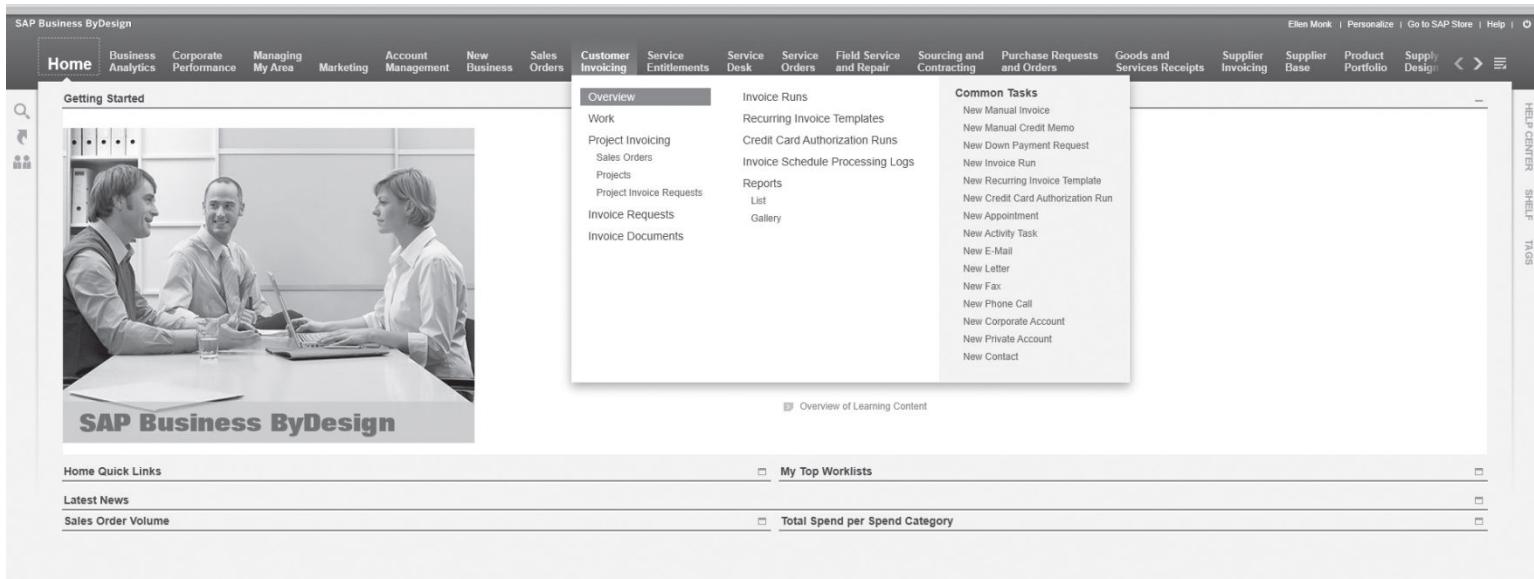


Figure 8-4 SAP Business ByDesign main screen

# SAP Business ByDesign (cont'd.)

- PlaNet Finance
  - A small organization that offers microloans to customers in 30 international offices
  - Finds Business ByDesign is a good fit for its needs

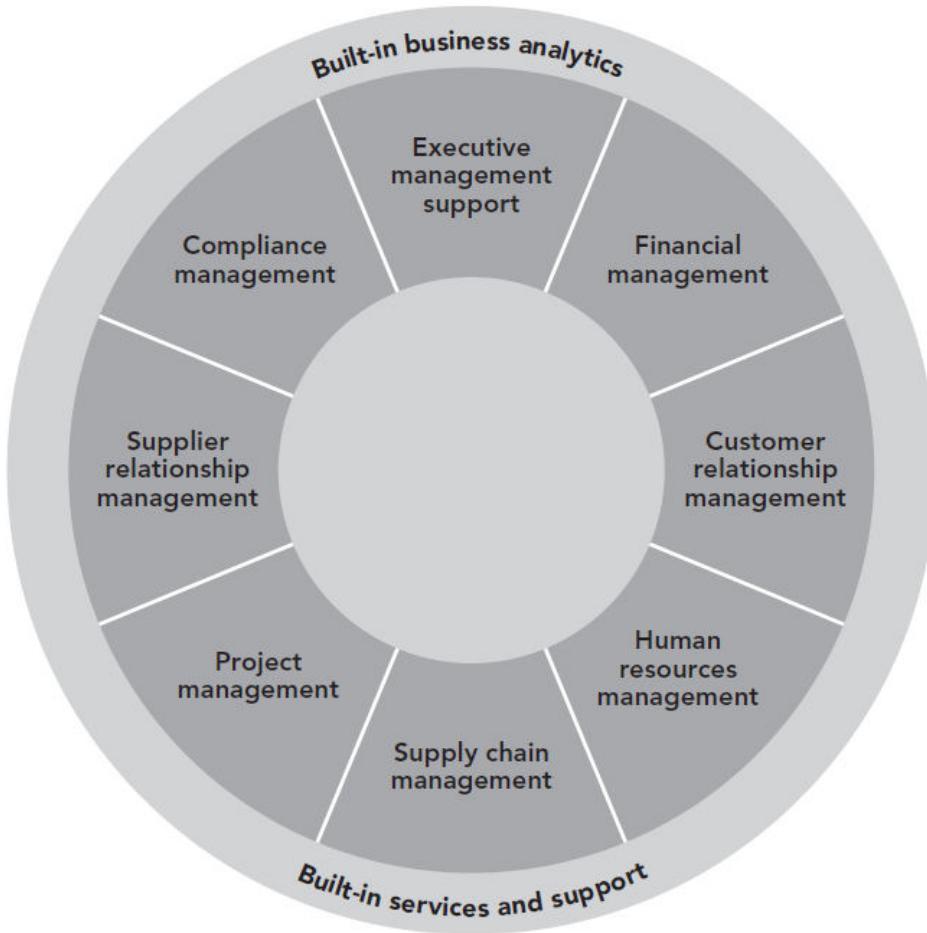


FIGURE 8-5 SAP Business ByDesign's key capabilities

# Advantages of Using SaaS

- Initial affordability
  - Lower cost to implement software provided through SaaS
- Shorter implementation time
  - Implementation time usually shorter as the user does not have to worry about technical issues
- Lower support costs and complexity
  - Do not need to hire additional IT personnel to implement new systems and applications

# Disadvantages of Using SaaS

- Security
- Bandwidth/response time
- Flexibility
- No frills
- Technical, not business focus
- Exercise 8.2
  - Fitter has made the decision to acquire an ERP system

Advantages of purchasing software and computers for ERP	Advantages of using SaaS to run ERP

FIGURE 8-7 Arguments for purchasing ERP system and software versus using SaaS

# Option 1: Buying Computers and Software Rights for an ERP System

- Estimated costs to set up its own ERP system:
  - Database server
  - Application server
  - PCs
  - Computer maintenance
  - Licensing rights
  - Installation
  - User training
  - Ongoing consulting
  - Network and database administrator

# Option 2: Using an SaaS Provider to Deliver ERP Software

- Estimated costs for using an SaaS provider to deliver ERP software:
  - PCs
  - Computer maintenance
  - Software through the SaaS provider
  - User training

# Calculate the NPV and Make a Recommendation

- You will set up a spreadsheet to total all the costs of each option
- In each scenario, you must deal with the net present value (NPV) of money
- NPV
  - A way to figure out whether an investment is profitable
  - In this case, to compare outlay of funds from one method to another
  - Addresses the time value of money

# Calculate the NPV and Make a Recommendation (cont'd.)

- When calculating two different investment options, NPV calculation allows:
  - Different future expenses or earnings to be calculated as an equivalent amount in the present time
- NPV can be calculated over a number of years
  - In example: we need a five-year outlay of funds for the ERP project

# Calculate the NPV and Make a Recommendation (cont'd.)

- In an Excel spreadsheet, the syntax of NPV calculation:  
 $=NPV(hurdle\ rate\ percentage, range\ of\ values)$ 
  - Values in range can be positive or negative numbers
  - Hurdle rate
    - Rate of discount over the period
    - Minimum acceptable rate of return on a project that a company will accept

<b>ERP Purchasing Options</b>					
<i>Option 1 - Buying computers and software outright</i>					
<b>Items</b>		<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
Database server		70000			
Application server		40000			
10 PCs		15000			
Software		500000			
Consultants - initial (6 months)		486000			
Training (2 weeks)		23000			
Consultants - maintenance (1 day per month)		36000	36000	36000	36000
PC maintenance		12000	12000	12000	12000
Network administrator		200000	200000	200000	200000
<b>Total</b>		1334000	248000	248000	248000
<b>NPV</b>		\$1,646,671.81			
<i>Option 2 - Using SaaS</i>					
PCs		15000			
PC maintenance		7200	7200	7200	7200
ASP cost		400000	400000	400000	400000
<b>Total</b>		415000	407200	407200	407200
<b>NPV</b>		\$1,224,277.26			
Hurdle rate		20%			

Figure 8-8 Cost comparisons: buying versus SaaS

# Calculate the NPV and Make a Recommendation (cont'd.)

- Perform the following steps:
  - Calculate the cost of the two methods of implementing an ERP system for five years
  - Consider using different hurdle rates for each option
    - Why might varying hurdle rates be applicable for this decision?
  - Write a memo, with your spreadsheet attached, to the CIO
    - Answer this question: Which method should Fitter choose, and why?

# Summary

- Technologies such as radio frequency identification (RFID) and smartphones are fueling explosive growth in the amount of data available for businesses to process
- Business intelligence (BI) tools are growing in sophistication and power
  - Technologies such as in-memory computing will provide greater speed and flexibility to BI users
- Mobile computing technology is increasing the use of ERP and BI data

# Summary (cont'd.)

- Cloud computing is the delivery of a software product to a user via the Internet
- Web services and service-oriented architecture offer a combination of software tools that enables various programs within an organization to communicate with other applications
- SAP's Web services platform is NetWeaver
  - A collection of components that support business transactions over the Internet by providing seamless connectivity of diverse applications through the Internet

# Summary (cont'd.)

- Software as a service (SaaS) is a software delivery model in which a software product is hosted by a company—such as SAP—on its servers and is accessed by customers via a Web browser
  - SaaS model allows companies to use ERP without a large initial investment
  - SaaS solutions allow for more rapid improvements in the software through user communities
  - There are some risks associated with using an SaaS provider