- Desktop's user presentation integration with appropriate business applications and system administration,
- Background processing to support concurrent processing of several tasks of the R/3 software system,
- Spool system to speed up a flow of data, procedures, and command among involved software components,
- System administration tools,
- Communication interfaces to external systems,
- Other.

The R/3 software system can work under main commercial operating systems such as UNIX (Sun Microsystems only), Windows NT+, IBM AS/400, and others.

The SAP R/3 system package is composed of about 25 modules (depending on how they are grouped) which are illustrated in Figure 4-5. When customized changes are introduced to one module of the package, other related data elements and modules are automatically updated.

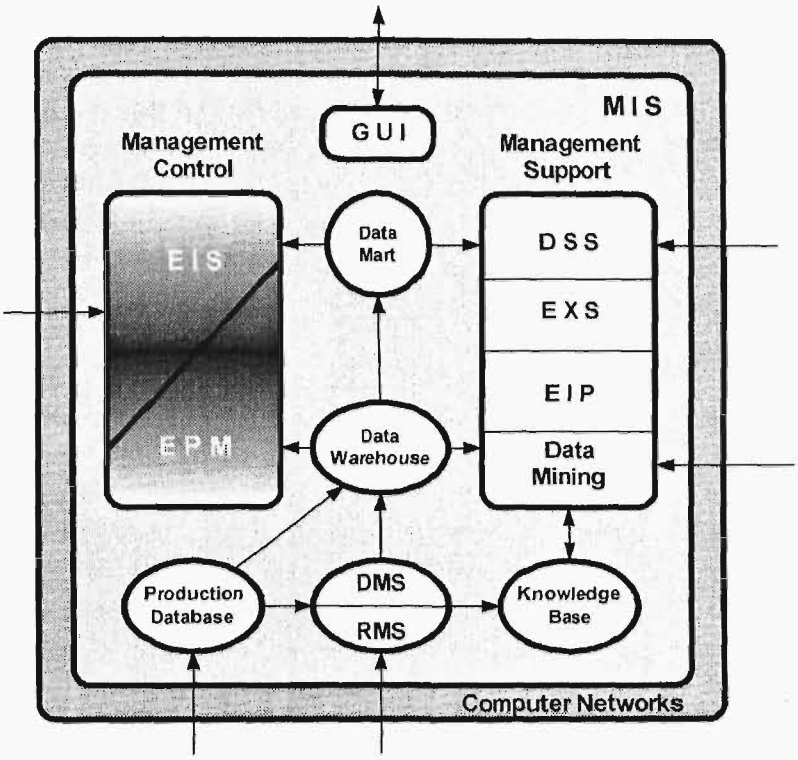
MIS-MANAGEMENT INFORMATION SYSTEMS

In the past, Management Information Systems reflected all static systems developed for business information processing, characterized by their high-volume of transactions and lengthy reports, programmed in COBOL (user unfriendly language). These types of "systems" nowadays are called legacy systems. However, according to our AL generic model in Figure 4-3, MIS reflect systems that manage the whole enterprise, as is illustrated in Figure 4-6.

The system components of the MIS federation have the following purposes:

- GUI – Graphic User Interface – an on-screen menu which is easy to navigate through the enter key and arrow keys.

Figure 4-6: The Generic Architecture of Management Information Systems (The Targowski Model)



- EIS – Executive Information System – a system which is easy to use, containing a summary of information (mostly in a graphic manner) about the performance of the enterprise or its departments' key indicators.

- EPM – Enterprise Performance Management System – a system which contains information about the performance of the enterprise or its departments' key indicators in a scope of plan-actual.

- DSS – Decision Support System – a system which is based on mathematical models such as spreadsheets, linear programming, etc., is applied, for example, to recalculate a budget or optimize a production or transportation plan.

- EXS – Expert System – a system which is based on artificial intelligence is applied in the decision-making automation when decisions are well structured, ill-structured, or unstructured.

- EIP – Enterprise Information Portal, later described in this chapter.

- Data Mining – software which analyzes the content of Data Warehouse in order to find behavioral patterns of customers (and other stakeholders) and units.

- Production Database – a database software which stores the enterprise's unredundant data elements created from transactions or other actions. This database is applied in processing the majority of the enterprise applications, such as payroll, accounting, sales, production planning, stock control, and so forth.

- Data Warehouse – a database which is a copy of the most applied data elements in cross-functional systems, such as EIS, EPM, DSS, EXS, and so forth.

- Knowledge Base – a database which stores business rules and behavioral patterns (knowledge management) defined by the data mining software.

- Data Mart – a database which stores data, information, and knowledge for a given user or a function/activity to discover patterns and trends for specific issues.

- DMS – Data Management System manages the document life cycle by supporting:
  - Document creation, applying templates and style sheets,
  - Document modification and tracking its versions,
  - Document security through access restrictions,
  - Document approval by different officers via WFS,
  - Document distribution/publishing via e-mail, on a Website or on a paper,
  - Document archiving on optical disks,

- RMS – Records Management System manages multi-media-based images (e.g., images of Kellogg's cereal boxes, movies) and directories[3].

Data Warehouse, Data Marts, Knowledge Base, and Data Mining are components of a Knowledge Management System which is described in this chapter later.

EIS-Executive Information System

The objective of this system is to gather, analyze, and integrate internal (corporate) and external (public) data into dynamic profiles of key corporate indicators for senior managers. Depending on the nature of the organization's business, such indicators may relate to the status of high-priority programs, health of the economy, inventory and cash levels, performance of financial markets, relevant efforts of competitors, utilization of manpower, legislative events, and so forth. The indicators are displayed as text, tables, graphics, or time series, and optional access is provided to more detailed data/information. The data/information comes not only from the organization's internal sources but from external sources too. By simply pointing and clicking on various "Who, What, When, and Why" buttons, the user can select and investigate such critical areas as workers' utilization, revenue analysis, census comparisons, cash flows, current bookings levels, vendor performance, inventory valuation, past due work orders, accounts receivable and accounts payable aging, and much more.

In military organizations, the approximate equivalent of EIS is the Command-Control System (CCS). EIS makes use of computational aids for data classification, modeling, optimization, and simulation. These capabilities are characteristic of Decision Support Systems (DSS) and Expert Systems (EXS). The latter are applied for ill-structured and unstructured decisions, supported by artificial intelligence (including neural computers and networks) to enhance EIS with adaptive and self-organizing abilities by means of learning from the executives' changing information needs and patterns of decision-making in practice.

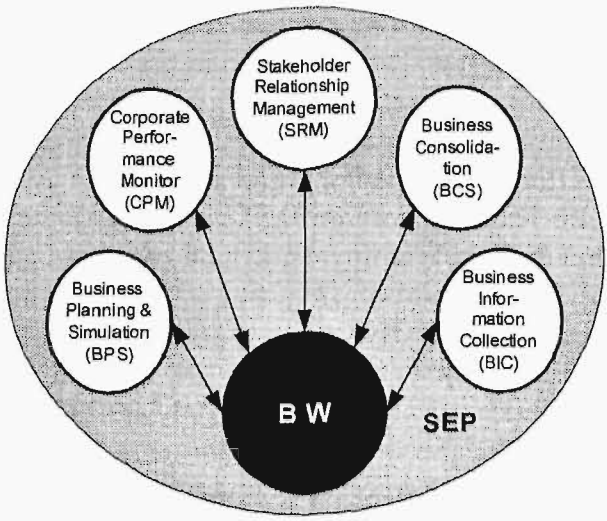
In the 2000's the SAP software was expanded by Strategic Enterprise Management (SEM) system[4], which is according to the enterprise model a classic EIS.

The SAP SEP is a mySAP.com application component that supports completely strategic enterprise management processes in an organization on various levels. It is comprised of the five following components:

- Business Information Collection (BIC) automates the sourcing of unstructured business information from the Web,

- Business Planning and Simulation (BPS) links strategic planning and simulation with cross-functional enterprise planning, for example applying scorecards,

Figure 4-7: Strategic Enterprise Management (SAP SEP)



- Business Consolidation (BCS) consolidates financial and management components,
- Corporate Performance Monitor (CPM) communicates and monitors performance and strategy through Balanced Scorecard, Management Cockpit, and Value Driven Trees,
- Stakeholders Relationship Management (SRM) integrates the most important stakeholders into your enterprise management process.

SEM applications operate on a common OLAP database composed of Business Warehouse (BW) and InfoCubes, as it is illustrated in Figure 4-7.

EPM-Enterprise Performance Management System

The system evolves as an internal system which applies such techniques as Balanced Scorecard, Value-based Management, Critical Success Factors, and Key Performance Indicators. But measurement alone is not enough.

Cross-organization research (www.lotus.com) indicates that:

- 60% of companies are not able to articulate and communicate their strategy effectively throughout their organization,
- Only 10% are able to deliver on their strategy,
- 90% believe that a clear, action-oriented understanding of their strategy will significantly influence their success.

The research shows that organizations need a way to formalize, accumulate, and leverage their knowledge about performance and how to manage performance. In today's fast-changing, networked enterprises, a configurable intranet or groupware solution such as EPM system is essential.

The ADBS – EPM system, designed by Arthur Andersen, applies the Show Business Toolset available from Show Business and Lotus Development. The ADBS' content is organized in four perspectives: Customer, Financial, Internal Business Process, and Learning and Growth, according to the Balanced Scorecard concept (Kaplan and Norton, 1996) to provide a strategic and balanced view for decision-making. This is a tool to mobilize the workforce to fulfill the company's mission and strategy. Through these four dimensions executives and workers can align individual, organizational, and cross-departmental initiatives and identify entirely new processes for meeting customer and shareholders' objectives.

The ADBS-EPM system includes:

- A customized set of indicators to the user's needs,
- Tracking of corrective actions to completion,
- Quick overview of measures, with traffic-lighting to show trouble spots,
- Easy-to-use report catalog, containing all relevant reports in cross-sections of the past, present, and future,
- Easy to navigate paths through the report databases, using the Notes or intranet infrastructure,

- Workflow for knowledge requests,
- Clear action reports, which are updated immediately.

The example of the EPM system based on the Balanced Scorecard is illustrated in Figure 4-8.

The architecture of the EPM system is open, scaleable, and ultimately an ideal platform on which it is possible to build business intelligence systems. For example, PeopleSoft Enterprise Warehouse draws from the vendor's applications as well as from other ERP applications and legacy systems to stage, store, and make information available for decision-making and analysis.

To evaluate an enterprise's performance one must compare key indicators with targets to discover at what state of affairs there is a managed enterprise or its unit. The present solutions of EPM systems compare a target with its actual value and draw conclusions about the change, either negative or positive. However, the computer can do more if we recognize the following states of affairs:

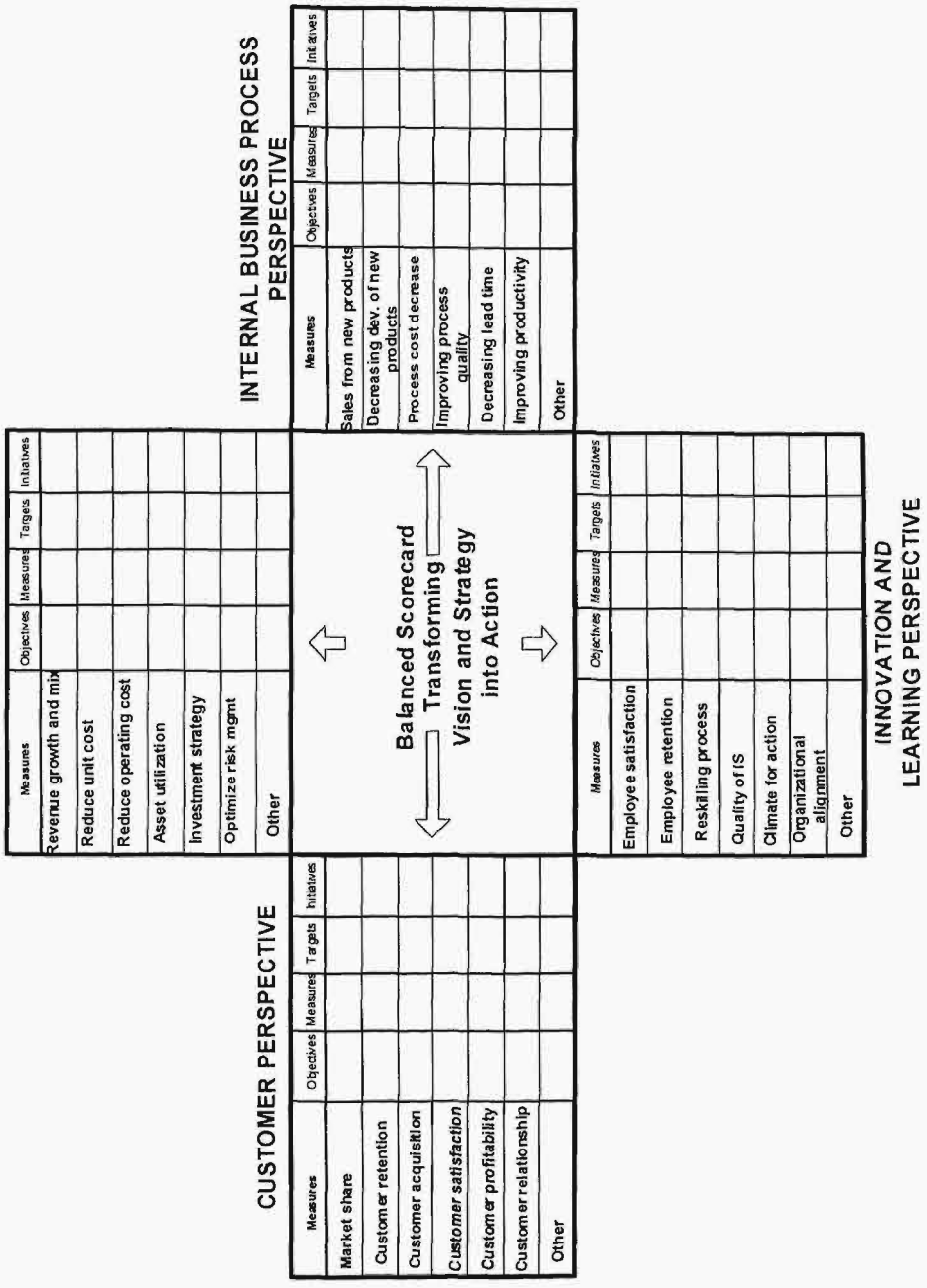
- The normal state – measure coming from *data processing,*
- The conflict state – change coming from *information processing,*
- The crisis state – judgment coming from *concept processing,*
- The success state – judgment coming from *concept processing,*
- The failure state – judgment coming from *concept processing.*

Compare the outcomes with the Semantic Ladder from the beginning of this chapter.

The standard value for each state is arbitrarily set by the user-decision maker, in reference to the enterprise's plans, performance practice, and the perception of market conditions.

Let's apply this concept for company XYZ which produces cereal and whose packaging unit's performance is evaluated. The manager of this unit suggested that computers have the most impact in the packaging area, at least in the aspect of control, because standards are more easily set and measured. He claimed that the actual production of the cereal is more an art than a science, thereby making it difficult to implement computer control. However, he

Figure 4-8: The Example of Enterprise Performance Management System as a Balanced Scorecard



emphasized that packaging was a very important part of the production process because governmental regulations and customer satisfaction are both important as the company tries to make a profit.

Several key indicators are used in cereal plant performance monitoring and control. Three key indicators have been chosen that relate to the quality control of packaging and also to the quantity packaged. The indicators for a given product are as follow:

	Weight	Fullness	#Produced
a. Normal state	12 oz. Lowest/ Highest	3 in. Lowest/ Highest	2.5 K Lowest/ Highest
b. Conflict state	10/14	2.7/3.3	2.3/2.8
c. Crisis state	8/16	2.4/3.6	1.9/3.2
d. Failure state	6/8	2/4	1.25/3.85
e. Success state	11.85	2.9	2.48

The EPM system can display/print results in different colors, and furthermore, if each state of affairs is preprogrammed with ways of action, then a manager not only has a concept of the state of affairs but also knows what to do in the case of negative outcomes.

KMS-KNOWLEDGE MANAGEMENT SYSTEM

General Architecture

The desire to preserve knowledge is as old as our civilization. The practice of keeping records in archives was used in 4,000 B.C. in Syria, and later in 4th century B.C. a large library (*Bibliotheca Alexandrina*) was created in Alexandria in Egypt, which lasted almost 1000 years, and at its peak storaged about 700,000 handwritten works. Copies of these documents were distributed by this library throughout the world. The development of papyrus allowed us to record academic and administrative documents and it took almost 1400 years (between 5th century B.C. and 9th century A.D.) to develop a reliable technology. At the same time the alphabet was transformed from mnemonic into phonetic and it allowed for reading and writing as common skills around the 12th century A.D. The discovery of print in the middle of the 15th century