

An  
In-Depth Review of  
ENTERPRISE RESOURCE  
PLANNING



ERP System Overview,  
Methodology  
& List of ERP  
Software Options



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COALITION

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# Chapter 1

## Enterprise resource planning

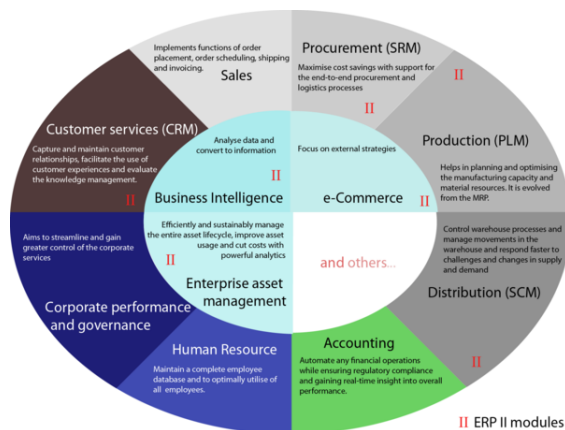


Diagram showing some typical ERP modules

**Enterprise resource planning (ERP)** is a category of business-management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities, including:

- product planning, cost
- manufacturing or service delivery
- marketing and sales
- inventory management
- shipping and payment

ERP provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system. ERP systems track business resources—cash, raw materials, production capacity—and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across various departments (manufacturing, purchasing, sales, accounting, etc.) that provide the data.<sup>[1]</sup> ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.<sup>[2]</sup>

Enterprise system software is a multibillion-dollar industry that produces components that support a variety

of business functions. IT investments have become the largest category of capital expenditure in United States-based businesses over the past decade. Though early ERP systems focused on large enterprises, smaller enterprises increasingly use ERP systems.<sup>[3]</sup>

The ERP system is considered a vital organizational tool because it integrates varied organizational systems and facilitates error-free transactions and production. However, developing an ERP system differs from traditional system development.<sup>[4]</sup> ERP systems run on a variety of computer hardware and network configurations, typically using a database as an information repository.<sup>[5]</sup>

### 1.1 Origin

The Gartner Group first used the acronym ERP in the 1990s,<sup>[6]</sup> where it was seen to extend the capabilities of material requirements planning (MRP), and the later manufacturing resource planning (MRP II),<sup>[7][8]</sup> as well as computer-integrated manufacturing. Without replacing these terms, ERP came to represent a larger whole that reflected the evolution of application integration beyond manufacturing.<sup>[9]</sup>

Not all ERP packages developed from a manufacturing core; ERP vendors variously began assembling their packages with accounting, maintenance, and human-resource components. By the mid-1990s ERP systems addressed all core enterprise functions. Governments and non-profit organizations also began to use ERP systems.<sup>[10]</sup>

### 1.2 Expansion

ERP systems experienced rapid growth in the 1990s. Because of the year 2000 problem and introduction of the euro disrupted legacy systems, many companies took the opportunity to replace their old systems with ERP.<sup>[11]</sup>

ERP systems initially focused on automating *back office functions* that did not directly affect customers and the public. *Front office functions*, such as customer relationship management (CRM), dealt directly with cus-



tomers, or e-business systems such as e-commerce, e-government, e-telecom, and e-finance—or supplier relationship management (SRM) became integrated later, when the Internet simplified communicating with external parties.

“ERP II” was coined in 2000 in an article by Gartner Publications entitled *ERP Is Dead—Long Live ERP II*.<sup>[12]</sup> It describes web-based software that provides real-time access to ERP systems to employees and partners (such as suppliers and customers). The ERP II role expands traditional ERP resource optimization and transaction processing. Rather than just manage buying, selling, etc.—ERP II leverages information in the resources under its management to help the enterprise collaborate with other enterprises.<sup>[13]</sup> ERP II is more flexible than the first generation ERP. Rather than confine ERP system capabilities within the organization, it goes beyond the corporate walls to interact with other systems. *Enterprise application suite* is an alternate name for such systems.

Developers now make more effort to integrate mobile devices with the ERP system. ERP vendors are extending ERP to these devices, along with other business applications. Technical stakes of modern ERP concern integration—hardware, applications, networking, supply chains. ERP now covers more functions and roles—including decision making, stakeholders’ relationships, standardization, transparency, globalization, etc.<sup>[14]</sup>

### 1.3 Characteristics

ERP (Enterprise Resource Planning) systems typically include the following characteristics:

- An integrated system that operates in (or near) real time without relying on periodic updates
- A common database that supports all applications
- A consistent look and feel across modules
- Installation of the system with elaborate application/data integration by the Information Technology (IT) department, provided the implementation is not done in small steps<sup>[15]</sup>

### 1.4 Functional areas of ERP

An ERP system covers the following common functional areas. In many ERP systems these are called and grouped together as *ERP modules*:

- **Financial accounting:** General ledger, fixed asset, payables including vouchering, matching and payment, receivables cash application and collections, cash management, financial consolidation

- **Management accounting:** Budgeting, costing, cost management, activity based costing
- **Human resources:** Recruiting, training, rostering, payroll, benefits, 401K, diversity management, retirement, separation
- **Manufacturing:** Engineering, bill of materials, work orders, scheduling, capacity, workflow management, quality control, manufacturing process, manufacturing projects, manufacturing flow, product life cycle management
- **Order Processing:** Order to cash, order entry, credit checking, pricing, available to promise, inventory, shipping, sales analysis and reporting, sales commissioning.
- **Supply chain management:** Supply chain planning, supplier scheduling, product configurator, order to cash, purchasing, inventory, claim processing, warehousing (receiving, putaway, picking and packing).
- **Project management:** Project planning, resource planning, project costing, work breakdown structure, billing, time and expense, performance units, activity management
- **Customer relationship management:** Sales and marketing, commissions, service, customer contact, call center support — CRM systems are not always considered part of ERP systems but rather Business Support systems (BSS).
- **Data services :** Various “self-service” interfaces for customers, suppliers and/or employees

### 1.5 Components

- Transactional database
- Management portal/dashboard

### 1.6 Best practices

Most ERP systems incorporate *best practices*. This means the software reflects the vendor’s interpretation of the most effective way to perform each business process. Systems vary in how conveniently the customer can modify these practices.<sup>[16]</sup> Companies that implemented industry best practices reduced time-consuming project tasks such as configuration, documentation, testing, and training. In addition, best practices reduced risk by 71% compared to other software implementations.<sup>[17]</sup>

Use of best practices eases compliance with requirements such as IFRS, Sarbanes-Oxley, or Basel II. They can also help comply with de facto industry standards, such

as **electronic funds transfer**. This is because the procedure can be readily codified within the ERP software, and replicated with confidence across multiple businesses who share that business requirement.

## 1.7 Connectivity to plant floor information

ERP systems connect to real-time data and transaction data in a variety of ways. These systems are typically configured by **systems integrators**, who bring unique knowledge on process, equipment, and vendor solutions.

**Direct integration**—ERP systems have connectivity (communications to plant floor equipment) as part of their product offering. This requires that the vendors offer specific support for the plant floor equipment their customers operate. ERP vendors must be experts in their own products and connectivity to other vendor products, including those of their competitors.

**Database integration**—ERP systems connect to plant floor data sources through staging tables in a database. Plant floor systems deposit the necessary information into the database. The ERP system reads the information in the table. The benefit of staging is that ERP vendors do not need to master the complexities of equipment integration. Connectivity becomes the responsibility of the systems integrator.

**Enterprise appliance transaction modules (EATM)**—These devices communicate directly with plant floor equipment and with the ERP system via methods supported by the ERP system. EATM can employ a staging table, web services, or system-specific program interfaces (APIs). An EATM offers the benefit of being an off-the-shelf solution.

**Custom-integration solutions**—Many system integrators offer custom solutions. These systems tend to have the highest level of initial integration cost, and can have a higher long term maintenance and reliability costs. Long term costs can be minimized through careful system testing and thorough documentation. Custom-integrated solutions typically run on **workstation** or server-class computers.

## 1.8 Implementation

ERP's scope usually implies significant changes to staff work processes and practices.<sup>[18]</sup> Generally, three types of services are available to help implement such changes—consulting, customization, and support.<sup>[18]</sup> Implementation time depends on business size, number of modules, customization, the scope of process changes, and the readiness of the customer to take ownership for the project. Modular ERP systems can be imple-

mented in stages. The typical project for a large enterprise takes about 14 months and requires around 150 consultants.<sup>[19]</sup> Small projects can require months; multinational and other large implementations can take years. **Customization** can substantially increase implementation times.<sup>[19]</sup>

Besides that, information processing influences various business functions e.g. some large corporations like **Wal-Mart** use a **just in time** inventory system. This reduces inventory storage and increases delivery efficiency, and requires up-to-date-data. Before 2014, Walmart used a system called Inforem developed by **IBM** to manage replenishment.<sup>[20]</sup>

### 1.8.1 Process preparation

Implementing ERP typically requires changes in existing business processes.<sup>[21]</sup> Poor understanding of needed process changes prior to starting implementation is a main reason for project failure.<sup>[22]</sup> The difficulties could be related to the system, business process, infrastructure, training, or lack of motivation.

It is therefore crucial that organizations thoroughly analyze business processes before they implement ERP software. Analysis can identify opportunities for process modernization. It also enables an assessment of the alignment of current processes with those provided by the ERP system. Research indicates that risk of business process mismatch is decreased by:

- Linking current processes to the organization's strategy
- Analyzing the effectiveness of each process
- Understanding existing automated solutions<sup>[23][24]</sup>

ERP implementation is considerably more difficult (and politically charged) in decentralized organizations, because they often have different processes, business rules, data semantics, authorization hierarchies, and decision centers.<sup>[25]</sup> This may require migrating some business units before others, delaying implementation to work through the necessary changes for each unit, possibly reducing integration (e.g., linking via **Master data management**) or customizing the system to meet specific needs.<sup>[26]</sup>

A potential disadvantage is that adopting "standard" processes can lead to a loss of **competitive advantage**. While this has happened, losses in one area are often offset by gains in other areas, increasing overall competitive advantage.<sup>[27][28]</sup>

### 1.8.2 Configuration

Configuring an ERP system is largely a matter of balancing the way the organization wants the system to work

with the way it was designed to work. ERP systems typically include many settings that modify system operations. For example, an organization can select the type of inventory accounting—FIFO or LIFO—to use; whether to recognize revenue by geographical unit, product line, or distribution channel; and whether to pay for shipping costs on customer returns.<sup>[26]</sup>

### 1.8.3 Two tier enterprise resource planning

Two-tier ERP software and hardware lets companies run the equivalent of two ERP systems at once: one at the corporate level and one at the division or subsidiary level. For example, a manufacturing company uses an ERP system to manage across the organization. This company uses independent global or regional distribution, production or sales centers, and service providers to support the main company's customers. Each independent center or subsidiary may have its own **business models, workflows, and business processes**.

Given the realities of globalization, enterprises continuously evaluate how to optimize their regional, divisional, and product or manufacturing strategies to support strategic goals and reduce time-to-market while increasing profitability and delivering value.<sup>[29]</sup> With two-tier ERP, the regional distribution, production, or sales centers and service providers continue operating under their own business model—separate from the main company, using their own ERP systems. Since these smaller companies' processes and workflows are not tied to main company's processes and workflows, they can respond to local business requirements in multiple locations.<sup>[30]</sup>

Factors that affect enterprises' adoption of two-tier ERP systems include:

- Manufacturing globalization, the economics of sourcing in emerging economies
- Potential for quicker, less costly ERP implementations at subsidiaries, based on selecting software more suited to smaller companies
- Extra effort, (often involving the use of **Enterprise application integration**<sup>[31]</sup>) is required where data must pass between two ERP systems<sup>[32]</sup> Two-tier ERP strategies give enterprises agility in responding to market demands and in aligning IT systems at a corporate level while inevitably resulting in more systems as compared to one ERP system used throughout the organization.<sup>[33]</sup>

### 1.8.4 Customization

ERP systems are theoretically based on industry best practices, and their makers intend that organizations deploy them *as is*.<sup>[34][35]</sup> ERP vendors do offer customers

configuration options that let organizations incorporate their own business rules, but often feature gaps remain even after configuration is complete.

ERP customers have several options to reconcile feature gaps, each with their own pros/cons. Technical solutions include rewriting part of the delivered software, writing a homegrown module to work within the ERP system, or interfacing to an external system. These three options constitute varying degrees of system customization—with the first being the most invasive and costly to maintain.<sup>[36]</sup> Alternatively, there are non-technical options such as changing business practices or organizational policies to better match the delivered ERP feature set. Key differences between customization and configuration include:

- Customization is always optional, whereas the software must always be configured before use (e.g., setting up cost/profit center structures, organizational trees, purchase approval rules, etc.).
- The software is designed to handle various configurations, and behaves predictably in any allowed configuration.
- The effect of configuration changes on system behavior and performance is predictable and is the responsibility of the ERP vendor. The effect of customization is less predictable. It is the customer's responsibility, and increases testing activities.
- Configuration changes survive upgrades to new software versions. Some customizations (e.g., code that uses pre-defined "hooks" that are called before/after displaying data screens) survive upgrades, though they require retesting. Other customizations (e.g., those involving changes to fundamental data structures) are overwritten during upgrades and must be re-implemented.<sup>[37]</sup>

Customization advantages include that it:

- Improves user acceptance<sup>[38]</sup>
- Offers the potential to obtain competitive advantage vis-à-vis companies using only standard features

Customization disadvantages include that it:

- Increases time and resources required to implement and maintain<sup>[36]</sup>
- Inhibits seamless communication between suppliers and customers who use the same ERP system uncustomized
- Can create over reliance on customization, undermining the principles of ERP as a standardizing software platform

### 1.8.5 Extensions

ERP systems can be extended with third-party software.<sup>[39]</sup> ERP vendors typically provide access to data and features through published interfaces. Extensions offer features such as:

- Reporting, and republishing
- Capturing transactional data, e.g., using scanners, tills or RFID
- Access to specialized data and capabilities, such as syndicated marketing data and associated trend analytics
- Advanced planning and scheduling (APS)
- Managing facilities, and transmission in real-time

### 1.8.6 Data migration

Data migration is the process of moving, copying, and restructuring data from an existing system to the ERP system. Migration is critical to implementation success and requires significant planning. Unfortunately, since migration is one of the final activities before the production phase, it often receives insufficient attention. The following steps can structure migration planning:<sup>[40]</sup>

- Identify data to migrate
- Determine migration timing
- Generate data templates
- Freeze the toolset
- Decide on migration-related setups
- Define data archiving policies and procedures

## 1.9 Comparison to special-purpose applications

### 1.9.1 Advantages

The fundamental advantage of ERP is that integrated myriad business processes saves time and expense. Management can make decisions faster and with fewer errors. Data becomes visible across the organization. Tasks that benefit from this integration include:

- Sales forecasting, which allows inventory optimization.
- Chronological history of every transaction through relevant data compilation in every area of operation.

- Order tracking, from acceptance through fulfillment
- Revenue tracking, from invoice through cash receipt
- Matching purchase orders (what was ordered), inventory receipts (what arrived), and costing (what the vendor invoiced)

ERP systems centralize business data, which:

- Eliminates the need to synchronize changes between multiple systems—consolidation of finance, marketing, sales, human resource, and manufacturing applications
- Brings legitimacy and transparency to each bit of statistical data
- Facilitates standard product naming/coding
- Provides a comprehensive enterprise view (no “islands of information”), making real-time information available to management anywhere, any time to make proper decisions
- Protects sensitive data by consolidating multiple security systems into a single structure<sup>[41]</sup>

### 1.9.2 Benefits

- ERP can improve quality and efficiency of the business. By keeping a company’s internal business processes running smoothly, ERP can lead to better outputs that may benefit the company, such as in customer service and manufacturing.
- ERP supports upper level management by providing information for decision making.
- ERP creates a more agile company that adapts better to change. ERP makes a company more flexible and less rigidly structured so organization components operate more cohesively, enhancing the business—internally and externally.<sup>[42]</sup>
- ERP can improve data security. A common control system, such as the kind offered by ERP systems, allows organizations the ability to more easily ensure key company data is not compromised.
- ERP provides increased opportunities for collaboration. Data takes many forms in the modern enterprise. Documents, files, forms, audio and video, emails. Often, each data medium has its own mechanism for allowing collaboration. ERP provides a collaborative platform that lets employees spend more time collaborating on content rather than mastering the learning curve of communicating in various formats across distributed systems.



### 1.9.3 Disadvantages

- Customization can be problematic. Compared to the best-of-breed approach, ERP can be seen as meeting an organization's lowest common denominator needs, forcing the organization to find workarounds to meet unique demands.<sup>[43]</sup>
- Re-engineering business processes to fit the ERP system may damage competitiveness or divert focus from other critical activities.
- ERP can cost more than less integrated or less comprehensive solutions.
- High ERP switching costs can increase the ERP vendor's negotiating power, which can increase support, maintenance, and upgrade expenses.
- Overcoming resistance to sharing sensitive information between departments can divert management attention.
- Integration of truly independent businesses can create unnecessary dependencies.
- Extensive training requirements take resources from daily operations.
- Harmonization of ERP systems can be a mammoth task (especially for big companies) and requires a lot of time, planning, and money.<sup>[44]</sup>

Recognized ERP limitations have sparked new trends in ERP application development. Development is taking place in four significant areas: more flexible ERP, Web-enabled ERP, inter-enterprise ERP, and e-business suites.

### 1.10 See also

- List of ERP software packages
- Accounting software
- Business process management
- Cost accounting
- Cybernetics
- Document automation
- Data migration
- Economic planning
- Enterprise feedback management (EFM)
- Enterprise planning systems
- Enterprise system
- ERP modeling

- ERP for IT
- ERP system selection methodology
- Information technology management
- List of project management software
- Management information system
- Manufacturing operations management
- Material balance planning
- Operations research
- Service management
- Software as a service

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## 1.13 External links

- CIO Magazine’s ABCs of ERP

## Chapter 2

# Enterprise planning system

An **enterprise planning system** covers the methods of planning for the internal and external factors that affect an enterprise.

These factors generally fall under PESTLE. PESTLE refers to political, economic, social, technological, legal and environmental factors. Regularly addressing PESTLE factors falls under **operations management**. Meanwhile, addressing any event, opportunity or challenge in any one or many factors for the first time will involve **project management**.

As opposed to **enterprise resource planning (ERP)**, enterprise planning systems have broader coverage. Enterprise planning systems address the resources that are available or *not* available to an enterprise and its ability to produce products or resources and/or provide services. It also considers those factors that will positively or negatively affect the firm's ability to run these actions.

Enterprise planning systems will tend to vary and are flexible. These are due to the periodic and adaptive nature of strategy formation. These will also have tactical aspects. Typically, enterprise planning systems are part of a firm's knowledge base or corporate structure whether it formally identified and structured or simply executed these when the need appeared.

## 2.1 Purposes

An enterprise planning system will address at least three basic purposes to help the enterprise:

- survive
- compete
- thrive

### 2.1.1 Survival

An enterprise will plan for tactical moves for quick reaction to the PESTLE threats that affect its survival. For instance, right after Japan's Fukushima nuclear power plant has experienced explosions due to the earthquake

and the tsunami that followed, several enterprises (within and outside Japan) have publicly announced their course of actions to address the emergency.<sup>[1]</sup>

### 2.1.2 Competition

Meanwhile, an enterprise will plan for longer term strategic actions to address its competition or improve its **competitiveness**. For instance, enterprises will plan for, set budgets, implement and use **strategic information systems** as "information systems or information technology investments can be a source of competitive advantage".<sup>[2]</sup>

### 2.1.3 Opportunities

Most significantly, an enterprise will plan for using the PESTLE opportunities that are available to it. The profit and benefit motives justify most enterprise planning systems.<sup>[3]</sup>

### 2.1.4 Vulnerabilities

A fourth noteworthy purpose for enterprise planning systems is preparedness against terrorist attacks. As noted in the US Presidential Directive for **Critical infrastructure protection**, terrorist groups are likely to attack commercial infrastructure for economic sabotage. Enterprises that are providing products or services that are critical to the economic system of a nation are potential targets of extremists.

## 2.2 Strategic planning

Two major characteristics of EPSs are (1) variety and (2) flexibility. For instance, technological risks abound as even enterprise software are prone to obsolescence and **disruptive innovations**. Technology is not stagnant. Thus, variety and flexibility work to the advantage of a strategically adaptive or **agile enterprise** as PESTLE conditions change.



To illustrate this some more, ERP software prescribes processes to realize its promised benefits. However, compliance to these rigid, prescribed processes is often assumed rather than real. In many cases, the ERP software is accepted but the practices within the enterprise reflect inconsistencies with the prescribed processes of the software. In a sense, variety and flexibility in a standard ERP implementation will still manifest in many ways such as “workarounds, shadow systems, various forms of unintended improvisations, and organizational 'drift'” as the **knowledge workers** in the enterprise adapt to the realities of daily activities.<sup>[4]</sup>

With changing real world conditions, at least three components can structure enterprise strategy. These are:

- analytical frameworks for the evaluation of PESTLE data at a given time
- geographic coverage of operations to manage risks or maximize benefits from macroeconomic forces or government regulations
- projects integration to efficiently support enterprise operations

### 2.2.1 Strategy via analysis

Frameworks of analysis usually drive a firm’s strategy. These enable the firm to cope with the actions of its competitors, demands of its consumers or clients, nature of its operating environments, effects of government regulations in the places where it does business, or opportunities that are available among other factors.<sup>[5]</sup> Here, team planning is crucial. One group will normally specialize in one aspect like operations or government regulations. Managing the interrelation of PESTLE factors requires teamwork in the enterprise planning process.

A sample framework for general analysis is the **SWOT analysis**. Another is the **Balanced Scorecard** for performance measurement analysis.<sup>[6]</sup>

### 2.2.2 Strategy via geography

Enterprise strategy can also refer to the mix of structured actions that address the political, economic, social, technological, legal and environmental factors that affect a business or firm. These structured actions can be local, transnational, global or combination of local, transnational or global.<sup>[7]</sup> Hence, enterprises can have any of the following geographic strategies in their plans:

- local strategy
- regional strategy (Europe, North America, Asia-Pacific, etc.)
- international strategy

- global strategy
- global and local strategy<sup>[8]</sup>

### 2.2.3 Strategy via projects integration

Moreover, since management actions occur simultaneously in an enterprise, strategic planners can consider operations or **project portfolio management (PPM)** as crucial elements in an enterprise’s strategic planning guide.

For instance, the need to have strategic priorities across many projects in companies with multiple product development projects have made executives borrow principles from investment portfolio management to better manage the distribution of resources compared with the assessed risks for each project.<sup>[9]</sup>

Thus, PESTLE factors lead to strategy formation that will enable the enterprise to adapt to changing conditions. Meanwhile, the strategies that have been formed from the analytical framework processes of evaluating an enterprise’s condition will lead to detailed plans which could be part of a firm’s manual of operations or projects portfolio thrusts for funding and execution across the units or geographic coverage of the enterprise.

## 2.3 Planning and budgeting

Enterprise planning and budgeting go hand-in-hand as the wherewithal to execute plans will determine the success or failure of an enterprise strategy. In another light, expanding or limiting the budget for a particular operations aspect of the enterprise or an ongoing project in favor of another will signal changes to an enterprise’s strategy.<sup>[10]</sup> Hence, planning and budgeting are integral parts of any enterprise planning systems as these impact the strategic directions of the enterprise.

For instance, enterprise projects tend to be mutually dependent with other projects to leverage a firm’s engineering, financial and technology resources.<sup>[11]</sup> A market research project will trigger a research, development and engineering (RD&E) project for a new product. In turn, this RD&E project could trigger a production strategy project to manufacture the new product at the most efficient locations to bring it closer to its target consumers.<sup>[12]</sup> Hence, cutting the RD&E project budget in half or increasing it twice will have profound effects in the long term direction of an enterprise as this will affect the other units of the firm undertaking projects that are linked to the RD&E project.

### 2.3.1 Classifications

Enterprise planning and budgeting can be generally classified into:

- centralized
- devolved
- hybrid

**Centralized.** Headquarters or executive management directs all planning and budgets from the top then downwards in the organization hierarchy. It will closely follow Frederick Winslow Taylor's Principles of **Scientific Management**.

**Devolved.** Middle managers set plans effectively steering the enterprise's strategic direction. Executive management takes into account that the enterprise has knowledge workers that are experts in their respective fields. The Management Board approves the proposed strategic direction under certain financial constraints such as expected returns on investment or equity.

**Hybrid.** Executive management determines and sets the strategic direction of the enterprise based on the inputs of middle managers and the rank and file. In this set up, plans and budgets are negotiated.

Essentially, enterprise plans and budgets can be detailed in a top-down approach, generalized in a bottom-up approach, or combined in a top-down and bottom-up approach.

## 2.4 Group planning

Enterprise group planning will typically refer to the involvement of the major units of an enterprise such as the finance, marketing, production or technology departments. It can also refer to the involvement of the geographic units of a transnational or global firm. Some enterprises also involve external parties in their group planning where inputs from the crucial parts of the supply chain, cooperation and collaboration, or outsiders-looking-in are part of the firm's strategy.<sup>[13][14]</sup>

Enterprise group planning will usually manifest in regular board of directors' or management committee' meetings with varying frequencies such as monthly, quarterly or annually. Traditional meetings have required the physical presences of representatives from the various business units of the enterprise. With improvements in telecommunications, enterprise group planning can be conducted through video conferencing where participants may be dispersed geographically. However, video conferencing still appears to be an inadequate substitute when warm, interpersonal relations are part of the firm's culture.

Yet for fast-paced events like natural disasters or a meltdown of the financial markets that require immediate action from the enterprise, video conferencing might be the only option. Troubleshooting that requires the major resources of the enterprise will also entail enterprise group

planning. Here, enterprise planning systems take a tactical form rather than a strategic focus to preserve the stability or ensure the survival of the enterprise.

## 2.5 Transition plan

Enterprise transition plans will generally refer to change management-related actions in the case of mergers or in the implementation of an enterprise-wide project. The transition plan will cover the elimination of redundant functions in the case of a merger or the incorporation of new processes into business operations in the case of a technology project.

## 2.6 Planning software

Enterprise planning software will have varied or depth of coverage but will not essentially refer to enterprise resource planning software. This will include planning-centric software and the tools to support strategic planning for and across the enterprise, such as:

- strategy formation software
- performance measurement and evaluation software
- project management software
- scenario planning software
- data warehouse or business intelligence software

## 2.7 See also

- Business intelligence
- Business process management
- Enterprise relationship management
- Enterprise Information System
- Enterprise system
- Management information system
- Supply chain management

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## Chapter 3

# ERP system selection methodology

An **ERP system selection methodology** is a formal process for selecting an enterprise resource planning (ERP) system. Existing methodologies include:<sup>[1]</sup>

- SpecIT Independent Vendor Selection Management
- Kuiper's funnel method
- Dobrin's 3D decision support tool
- Clarkson Potomac method

### 3.1 Overview

Irrespective of whether the company is a multi-national, multi-million dollar organization or a small company with single digit million turnover, the goal of system selection is to source a system that can provide functionality for all of the business processes; that will get complete user acceptance; management approval and, most importantly, can provide significant return on investment for the shareholders.

Since the mid-1970s, when there was widespread introduction of computer packages into leading companies to assist in material requirements planning, software companies have striven,<sup>[2]</sup> and for the most part succeeded, to create packages that assist in all aspects of running a business from manufacturing; supply chain management; human resources; through to financials. This led to the evolution of ERP Systems.

Accordingly, a significant number of packages purporting to be ERP systems have entered into the marketplace since 1990.<sup>[3]</sup> There are packages at the upper end of the market and a vast quantity of other packages that vendors claim to be ERP Systems. There are also packages that claim to be best of breed for certain processes [such as planning] and sold merely as an add-on to an ERP System. The options are many and this, in reality, creates a problem for the company who has to make a decision.

The complexity of selecting an ERP system is further exacerbated by the fact that some systems are geared for discrete manufacturing environment where a distinct

amount of items make up a finished product while others are more suited to process industries such as chemical and food processing where the ingredients are not exact and where there might be re-work and byproducts of a process.<sup>[4]</sup>

In the last decade, companies have also become interested in enhanced functionality such as customer relationship management and electronic commerce capability.

Given all of the potential solutions, it is not uncommon for companies to choose a system that is not the best fit for the business and this normally leads to a more expensive implementation. Thus "ERP Costs can run as high as two or three percent of revenues".<sup>[5]</sup> A proper ERP system selection methodology will deliver, within time and budget, an ERP system that is best fit for the business processes and the user in an enterprise. It is used in small scale Enterprises for implement their organization towards the MIS.

### 3.2 Poor system selection

Companies seldom use a fully objective selection methodology when choosing an ERP System. Some common mistakes include:

#### Incomplete requirements

Because implementation of a new ERP system "requires people to do their job differently" (Wallace and Kremzar<sup>[6]</sup>), it is very important to understand user requirements, not only for current processes, but also future processes (i.e., before and after the new system is installed). Without detailed user requirements, review of systems for functional best-fit rarely succeeds. The requirements must go into sufficient detail for complex processes, or processes that may be unique to a particular business.

#### Reliance on vendor demos

Vendor demonstrations tend to focus on very simplistic processes. A typical demonstration shows an ideal order



to cash process where a customer orders a quantity of product that is in stock. The reality in most businesses is that most customers have varying and more complex commercial arrangements, and products are not always in stock.

### Over-emphasis on system cost

According to Finlay and Servant, “The differential in purchase price between packages is unlikely to be the dominant factor”.<sup>[7]</sup> While the cost of an ERP system is significant for a company, other important decision criteria, such as functionality; future proofing; underlying infrastructure [network & database]; and e-commerce capability among others, may be understressed.

### Selection bias

It is not unusual that the decision on which system to purchase is made by one individual or by one department within the company. In these situations, an ERP system that may be excellent at one function but weak at other processes may be imposed on the entire enterprise with serious consequences for the business.

### Failure to use objective professional services

One of the main reasons for failure in system selection is the understandable lack of knowledge within the company. Experienced consultants can provide information on all of the packages that are available in the marketplace; the latest functionality available in the most common packages and, most importantly, can assist the user in deciding whether a specific requirement would provide added value to the user and to the business. However, it is worth noting that the professional help must be provided by objective consultants who have no affiliation with ERP system vendors. “If a consultancy has built up an expertise in the use of a particular package then it is in its interest to recommend that package to its client”<sup>[7]</sup>

### Inability to understand offering by ERP vendor

“It is estimated that approximately 90% of enterprise system implementations are late or over budget”.<sup>[8]</sup> A plausible explanation for implementations being late and over budget is that the company did not understand the offering by the vendor before the contract was signed. A typical example of this would be the scenario where a vendor may offer 5 days of services for the purpose of data migration. The reality is that there is a huge amount of work required to input data onto a new system. The vendor will import the data into the new system but expects the company to put the data into a file that is easy to import into the system. The company are also expected to extract the data from the old system; clean the

data and add new data that is required by the new system. “ERP, to be successful, requires levels of data integrity far higher than most companies have ever achieved – or even considered. Inventory records, bill of materials (BOM), formulas, recipes, routings, and other data need to become highly accurate, complete and properly structured”.<sup>[6]</sup> This typical scenario is one of many issues that cause implementations to be delayed and invariably lead to requests for more resources.

## 3.3 A proper system selection methodology

To address the common mistakes that lead to a poor system selection it is important to apply key principles to the process, some of which are listed hereunder:

### Structured approach

The first step in selection of a new system is to adopt a structured approach to the process. The set of practices are presented to all the stakeholders within the enterprise before the system selection process begins. Everyone needs to understand the method of gathering requirements; invitation to tender; how potential vendors will be selected; the format of demonstrations and the process for selecting the vendor. Thus, each stakeholder is aware that the decision will be made on an objective and collective basis and this will always lead to a high level of co-operation within the process.

### Focused demonstrations

Demonstrations by potential vendors must be relevant to the business. However, it is important to understand that there is considerable amount of preparation required by vendors to perform demonstrations that are specific to a business. Therefore it is imperative that vendors are treated equally in requests for demonstrations and it is incumbent on the company [and the objective consultant assisting the company in the selection process] to identify sufficient demonstrations that will allow a proper decision to be made but will also ensure that vendors do not opt out of the selection process due to the extent of preparation required.

### Objective decision process

“Choosing which ERP to use is a complex decision that has significant economic consequences, thus it requires a multi-criterion approach.”<sup>[9]</sup> There are two key points to note when the major decision makers are agreeing on selection criteria that will be used in evaluating potential vendors. Firstly, the criteria and the scoring system must be agreed in advance prior to viewing any potential

systems. The criteria must be wide-ranging and decided upon by as many objective people as possible within and external to the enterprise. In no circumstance should people with affiliations to one or more systems be allowed to advise in this regard.

#### Full involvement by all personnel

The decision on the system must be made by all stakeholders within the enterprise. “It requires top management leadership and participation... it involves virtually every department within the company”.<sup>[6]</sup> Representatives of all users should:

- Be involved in the project initiation phase where the decision making process is agreed;
- Assist in the gathering of requirements;
- Attend the Vendor Demonstrations;
- Have a significant participation in the short-listing and final selection of a vendor.

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### 3.5 External links

- ERP Definitions and Solutions

# Chapter 4

## List of ERP software packages

This is a list of enterprise resource planning (ERP) software. The first section is devoted to free and open-source software, and the second is for proprietary software.

### 4.1 Free and open-source ERP software

### 4.2 Proprietary ERP vendors and software

- 1C Company - 1C:Enterprise
- 24SevenOffice - 24SevenOffice Start, Premium, Professional and Custom
- ABAS Software AG - abas Business Software
- The Access Group - Access SupplyChain
- Activant acquired by Epicor
- Acumatica - Acumatica Cloud ERP
- BASIS International - AddonSoftware
- BatchMaster Software - BatchMaster ERP
- Brightpearl
- Consona Corporation - AXIS ERP, Intuitive ERP, Made2Manage ERP
- CGI Group - CGI Advantage, Momentum
- CGram Software - CGram Enterprise
- Consona Corporation - Cimnet Systems, Compiere professional edition, Encompix ERP
- Ciright Systems - Ciright ERP
- Comarch - Comarch Altum, Comarch Semiramis
- Deacom - DEACOM ERP
- Exel Computer Systems - EFACS
- ENFOS
- Epicor - Epicor Enterprise, Epicor ERP, Prophet 21
- Erply - Retail ERP
- Exact Software - MAX, Macola 10, Globe Next, Exact Online
- Ferranti Computer Systems - MECOMS
- FinancialForce - FinancialForce ERP
- Fishbowl - Fishbowl Inventory
- Greentree International - Greentree Business Software
- IBM - Maximo (MRO)
- Inductive Automation - Ignition MES, OEE Module
- Industrial and Financial Systems - IFS Applications
- IndustryBuilt Software Corp. - JustFoodERP
- Infor Global Solutions - Lawson, Infor ERP BPCS/LX, Barcode, Discrete iEnterprise (XA), Infor10 Distribution Business (aka SX.Enterprise), Infor10 Distribution Express (aka FACTS), Infor10 ERP Business (aka SyteLine), Infor10 ERP Ln, Infor VISUAL, Infor10 ERP Process Business, ERP Blending, Sun System<sup>[1]</sup>
- Intacct - Intacct and Intacct Accountant Edition
- IQMS - EnterpriseIQ
- Jeeves Information Systems AB - Jeeves
- KISI - Physical Access Control KISI
- MetaQuotes Software corp. - TeamWox
- Microsoft - Microsoft Dynamics AX (formerly Axapta), Microsoft Dynamics GP (formerly Great Plains), Microsoft Dynamics NAV (formerly Navision), Microsoft Dynamics SL (formerly Solomon), NAV-X
- NetSuite Inc. - NetSuite
- NxTier - Nxtier VSC

- Open Systems Accounting Software - OSAS, TRAVERSE
- Openda - Openda QX
- Oracle - JD Edwards EnterpriseOne, JD Edwards World, Oracle E-Business Suite, Oracle Fusion, PeopleSoft
- Panaya - Panaya CloudQuality Suite
- Pegasus Software - Opera (I, II and 3)
- PeopleStrong - ALT
- Planet Soho - SohoOS
- Plex Systems - Plex Online
- ProfitKey International - ProfitKey, Rapid Response Manufacturing
- Pronto Software - Pronto Software
- QAD Inc - QAD Enterprise Applications (formerly MFG/Pro)
- Quintiq
- Ramco Systems - Ramco Enterprise Series 4.x, e.Applications, On Demand ERP
- Sage Group - PFW ERP, Pro ERP, 100 ERP (formerly Sage ERP MAS 90 and 200), 300 ERP (formerly Accpac), 500 ERP, ERP X3
- SAP - mySAP, SAP Business All-in-One, SAP Business ByDesign, SAP Business One, SAP Business Suite
- SESCOI - MyWorkPLAN, WorkPLAN Enterprise
- Syspro - SYSPRO
- Tata Consultancy Services - iON
- Technology One - Technology One
- Telaxus - Epesi
- TradeCard - TradeXpress
- Transtek - Compass ERP
- UFIDA - UFIDA NC, UFIDA ERP-U8 All-in-one, UFIDA U9
- Unit4 - Coda Financials, UNIT4 Business World
- Visibility - Visibility.net
- Workday, Inc. - Workday
- xTuple - OpenMFG

## 4.3 See also

- List of project management software
- ERP system selection methodology
- Comparison of accounting software

## 4.4 References

- [1] <http://www.infor.com/product-summary/efm/sunsystems/>



## Chapter 5

# Comparison of project management software

The following is a comparison of project management software.

### 5.1 General information

### 5.2 Features

### 5.3 Monetary features

### 5.4 See also

- Project management
- Project planning
- Comparison of Scrum software
- Comparison of Kanban software
- Comparison of development estimation software
- Comparison of source code hosting facilities

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