



ERP history and evolution

Dr. N. Abdolvand

ERP

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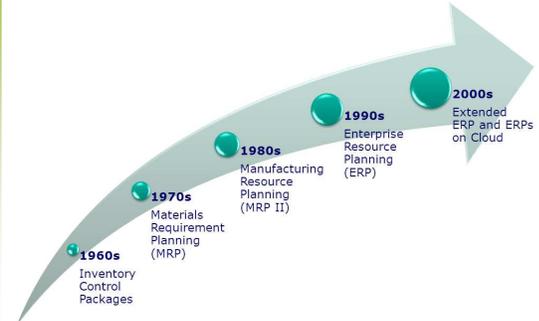
ERP SYSTEMS DEFINED

◆ Enterprise Resource Planning Systems or Enterprise Systems are software systems for business management encompassing modules supporting functional areas such as

- planning,
- manufacturing,
- sales,
- marketing,
- distribution,
- Accounting,
- financial,
- human resource management,
- project management,
- inventory management,
- service and maintenance,
- transportation and
- e-business

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ERP History



The diagram shows a large arrow pointing from the bottom-left to the top-right, representing the evolution of ERP systems over time. Four key stages are marked with green circles:

- 1960s**: Inventory Control Packages
- 1970s**: Materials Requirement Planning (MRP)
- 1980s**: Manufacturing Resource Planning (MRP II)
- 1990s**: Enterprise Resource Planning (ERP)
- 2000s**: Extended ERP and ERPs on Cloud

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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

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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

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Computer Hardware and Software Development

Year	Processor Model	Number of Transistors (approx.)
1971	4004	2,300
1972	8080	60,000
1982	8086	290,000
1985	80286	1,200,000
1985	80386	2,750,000
1989	80486	12,000,000
1993	Pentium	3,100,000
1997	Pentium II	7,500,000
2000	Pentium 4	29,000,000
2005	Itanium 2	200,000,000
2008	Core i7	731,000,000

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

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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

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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

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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

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MRP Systems

- ◆ Material Requirements Planning (MRP) is a computerized inventory control and production planning system for generating purchase orders and work orders of materials, components, and sub assemblies.
- ◆ Which materials and which quantities of these materials (secondary or derived requirements) are needed to produce a given production program (primary requirements)?
- ◆ How can the material requirements be fulfilled?

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Components of a MRP System

- ◆ MRP is a CBIS designed to handle the ordering and scheduling of dependent demand inventories.
- ◆ Major components of a MRP system:
 - Bill of materials - composition of the finished product.
 - Master schedule - how much of the finished product is desired and when.
 - Inventory records file - the amount of inventory on hand or ordered.

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MRP II Systems

- ◆ Manufacturing Resource Planning (MRP II) is an expansion of MRP, originating during the early 1980s.
- ◆ MRP II helps to plan all the resources necessary for manufacturing; including financial analysis, feedback loops, and marketing plans.

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MRP II Systems

- ◆ MRP II is simply an expansion of the scope of MRP to include other functional areas in the planning process.
- ◆ MRP II included areas such as
 - shop floor and distribution management,
 - Project management,
 - Finance,
 - Human Resource and
 - Engineering

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ERP explanation

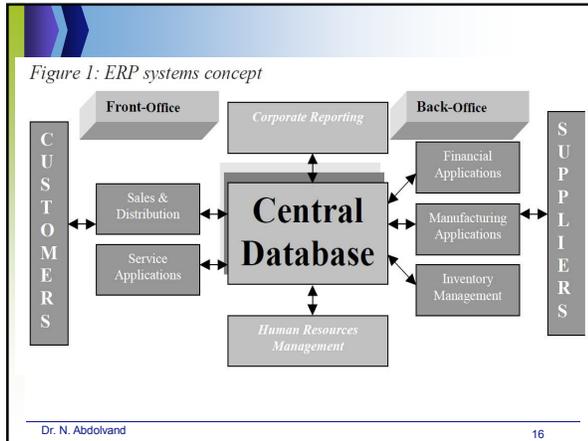
- ◆ The architecture of the software facilitates transparent integration of modules providing flow of information between all functions within the enterprise in a consistently visible manner.
- ◆ Corporate computing with ERPs allows companies to implement a single integrated system by replacing or re-engineering their mostly incompatible legacy information systems

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ERP Definition

- ◆ “a method for the effective planning and controlling of all the resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company.”
American Production and Inventory Control Society (APICS, 2001)
- ◆ “ERP (Enterprise Resource Planning Systems) comprises of a commercial software package that promises the seamless integration of all the information flowing through the company - financial, accounting, human resources, supply chain and customer information
(Davenport, 1998).

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extended ERPs

- ◆ ERP vendors added more modules and functions as “add-ons” to the core modules giving birth to the “extended ERPs”.
 - advanced planning and scheduling (APS),
 - e-business solutions
 - customer relationship management (CRM)
 - Supply chain management (SCM).

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Business Application Software

- ◆ The ERP, SCM, and CRM systems are usually standard software that has been customized according to the requirements of the individual organization.

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SCM

- ◆ Supply chain management stresses the collaboration between partners in a supply chain, including intensive information exchange and harmonization of the partners' respective procurement, production, and distribution plans
- ◆ Procurement, production, and distribution are planned both within the company and across the companies involved in the supply chains.

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CRM

- ◆ Customer relationship management (CRM) is an integrated approach to identifying, acquiring, and retaining customers.
- ◆ A CRM system is an information system that is used to plan, schedule, and control the presales and postsales activities in an organization
- ◆ CRM systems are composed of
 - operational and
 - analytical.
- ◆ many CRM systems include components for
 - ERM (employee relationship management) and
 - PRM (partner relationship management).

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Operational CRM

- ◆ Operational CRM primarily includes support for:
 - SFA
 - sales force automation—e.g., contact/prospect information, product configuration, sales quotes, sales forecasting etc.
 - EMA
 - enterprise marketing automation—e.g., capturing prospect and customer data, qualifying leads for targeted marketing, scheduling, and tracking direct marketing
 - CSS
 - customer service and support—e.g., call centers, help desks, customer support staff; web-based self-service capabilities etc.

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Analytical CRM

- ◆ Analytical CRM consolidates the data from operational CRM and uses analytical techniques to examine
 - customer behavior;
 - identify buying patterns;
 - create segments for targeted marketing;
 - identify opportunities for cross selling, upselling, and bundling; and
 - separate profitable and unprofitable customers.
- ◆ This is done with business intelligence techniques such as OLAP (online analytical processing) and data mining, based on a data warehouse

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Supplier Relationship Management

- ◆ SRM systems support administration and management of the relationships with the suppliers in many ways
- ◆ The functionality of an SRM system includes
 - analyzing existing suppliers;
 - assessing future suppliers,
 - supplier selection, and framework contracts; and
 - monitoring compliance of procurement activities with agreements, requests for quotations, bidding, catalog management, document management, and more.
- ◆ Many SRM systems also support procurement processes, but this is usually the domain of ERP systems.

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Product Life Cycle Management

- ◆ Product life cycle management (PLM) is an approach to manage products and production processes from the first product idea through the entire life cycle of the products.
- ◆ PLM was developed in the engineering field based on technological data and engineering application systems such as CAD (computer-aided design), CAE (computer-aided engineering), CAP (computer-aided planning), and CAM (computer-aided manufacturing).
- ◆ An important part of PLM is product data management (PDM).

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PLM

- ◆ “. . . encompasses all aspects of a product from early requirements, through design, into production and service, and finally recovery and disposal”
- ◆ PLM software “. . . serves as a central hub for product data, with associated software systems (CAD, ERP, CRM, SCM) obtaining their product-related information from the PLM system and, in some cases such as CAD, creating information for management within the PLM repository”

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Advantages of ERP systems

What benefit	How
Reliable information access	Common DBMS, Consistent and accurate data, improved reports.
Avoid data and operations redundancy	Modules access same data from the central database, avoids multiple data input and update operations.
Delivery and Cycle time reduction	Minimizes retrieving and reporting delays.
Cost reduction	Time savings, improved control by enterprise-wide analysis of organisational decisions.
Easy adaptability	Changes in business processes easy to adapt and restructure.
Improved scalability	Structured and modular design with "add-ons"
Improved maintenance	Vendor supported long term contract as part of the system procurement.
Global Outreach	Extended modules such as CRM and SCM.
E-Commerce, E-Business	Internet Commerce, Collaborative culture.

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Disadvantages of ERP systems

Disadvantage	How to overcome
Time consuming	Minimize sensitive issues, internal politics and raise general consensus.
Expensive	Cost may vary from thousands of dollars to millions. Business process re-engineering cost may be extremely high.
Conformity of the modules	The architecture and components of the selected system should conform to the business processes, culture and strategic goals of the organisation.
Vendor dependence	Single vendor vs multivendor consideration, options for "best of breeds", long term committed support.
Feature and complexity	SRP system may have too many features and modules that the user needs to consider carefully and implement the needful only.
Scalability and global outreach	Look for vendor investment in R&D, long term commitment to product and services, consider Internet-enabled systems.
Extended ERP capability	Consider middle-ware "add-on" facilities and extended modules such as CRM and SCM

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Questions?
