

ENTERPRISE RESOURCE PLANNING AND ENTERPRISE APPLICATION INTEGRATION

VINAY KARTHIK MARADI BALACHANDRA [AZF2YA]

What is ERP?

2

DEFINING ERP

ENTERPRISE RESOURCE PLANNING(ERP) is a cross functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company

What is ERP?

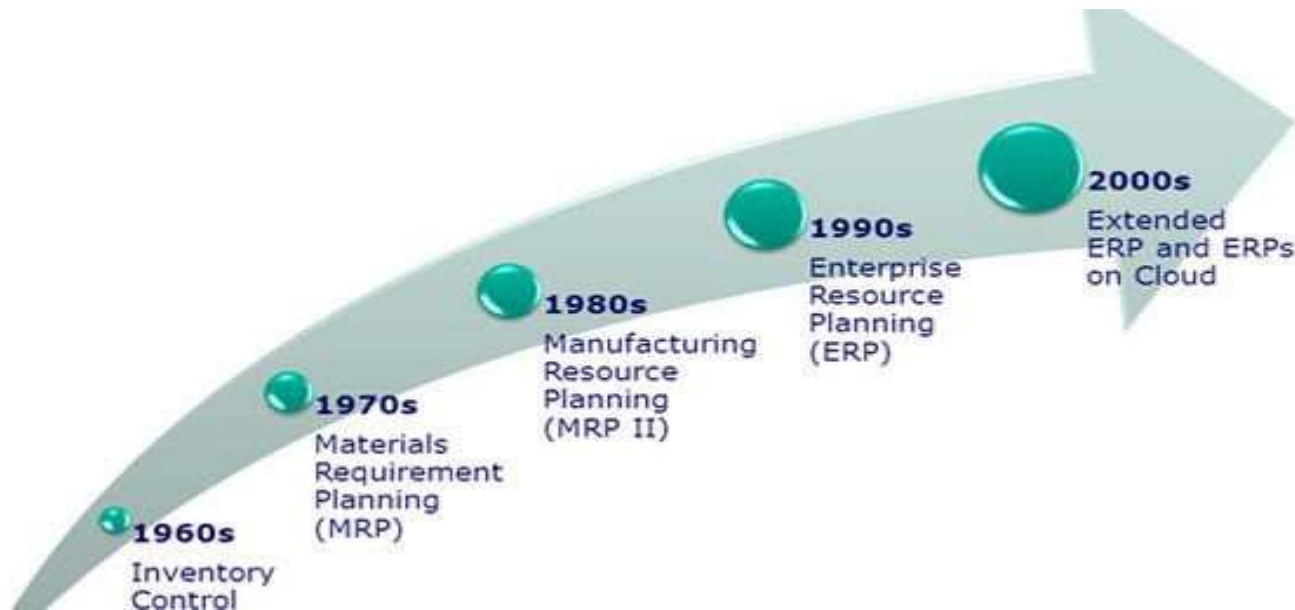
3

- The practice of consolidating an enterprise's planning, manufacturing, sales and marketing efforts into one management system.
- Combines all databases across departments into a single database that can be accessed by all employees.
- ERP automates the tasks involved in performing a business process.

ENTERPRISE RESOURCE PLANNING

- ▶ Consolidation of an organization's planning, production, sales, and marketing efforts into a single management structure.
- ▶ Consolidates all departmental databases into a single account that all workers can access
- ▶ ERP software automates the tasks required to complete a business process

Evolution of ERP Systems

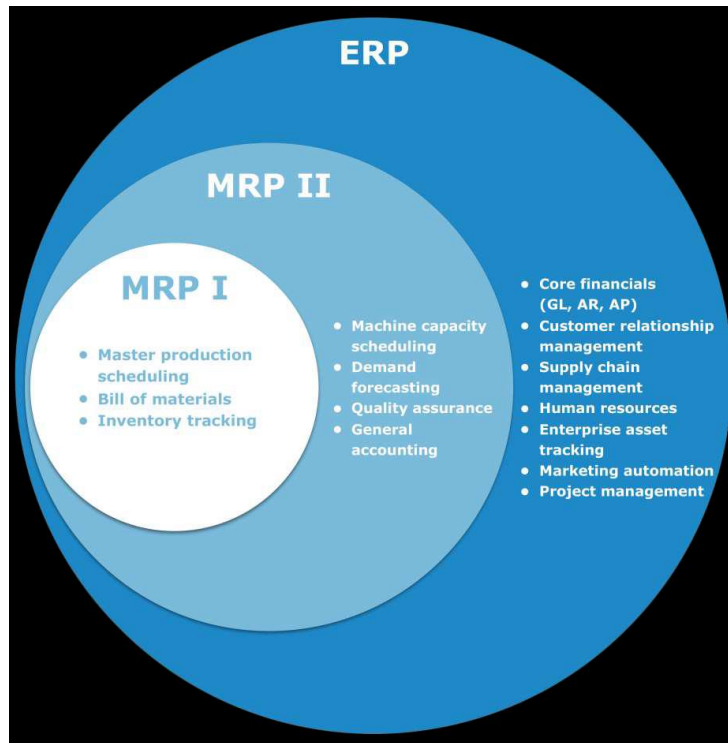


Evolution of ERP Systems

Inventory Management & Control-1960's

Inventory Management and control is the combination of information technology and business processes of maintaining the appropriate level of stock in a warehouse. The activities of inventory management include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status.

Evolution of ERP Systems



Material Requirement Planning (MRP)-1970's

Materials Requirement Planning (MRP) utilizes software applications for scheduling production processes. MRP generates schedules for the operations and raw material purchases based on the production requirements of finished goods, the structure of the production system, the current inventories levels and the lot sizing procedure for each operation.

Manufacturing Requirements Planning (MRP II)-1980's

Manufacturing Requirements Planning or MRP II utilizes software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution.



Enterprise Resource Planning (ERP)-1990's

Enterprise Resource Planning or ERP uses multi-module application software for improving the performance of the internal business processes. ERP systems often integrates business activities across functional departments, from product planning, parts purchasing, inventory control, product distribution, fulfillment, to order tracking. ERP software systems may include application modules for supporting marketing, finance, accounting and human resources.

FUTURE OF ERP SOFTWARE



1. IoT (Internet of things)

- ▶ The Internet of Things has been already taking the world by storm. It is an ecosystem of connected physical objects that can communicate with each other and can be accessible via the internet. So, any device which is a part of IoT can communicate to the ERP system. Moreover, these IoT devices can deliver all the relevant data including location, performance and other information required for the ERP application without the need of humans.

2. Big Data Analytics

- ▶ An ERP software records a massive amount of data and this information remains unused for the maximum benefits. With the increasing use cases, this data generation is ready to grow exponentially. ERP integrated with Big Data analytics tool can use this data to make accurate predictions, better business strategies and intelligent decisions. This way, big data analytics tools can reshape the future of ERP.

FUTURE OF ERP SOFTWARE



3. Wearable Technologies

- ▶ The wearable technology market has become a hot topic of discussion among many marketers. Based on a report from Juniper Research, the wearable technology market is estimated to reach \$68.7 million worth by 2019. For example, Augmented Reality glasses allows for hands-free operations that can be a gift to many blue collar workers. Even smart watches show a step forward compared to PDAs and smartphones because they are more easily accessible. Moreover, these watches have very fewer chances to be lost and dropped.

4. Cloud Technology

- ▶ For the past 3 decades, legacy and on premise ERP systems have dominated the global ERP market. The in-house ERP technology is not capable enough to take advantage of the latest trends and technologies because their platform does not support it.
- ▶ In the world of internet and cloud technologies, we will definitely see a paradigm shift in ERP systems. Cloud ERP solutions are all set to take over in ERP world as they are faster and support future updates. In fact, Cloud ERPs are flexible and have capabilities to support the latest technologies.

Typical Business Process : Key observation

- A typical enterprise has many Departments/ Business units(BU).
- These Departments/ BU continuously communicate and exchange data with each other.
- The success of any organization lie's in effective communication and data exchange within the Departments/ BU as well as associated third party such as Vendors, Outsourcers and Costumers.
- Also known as Decentralized System.

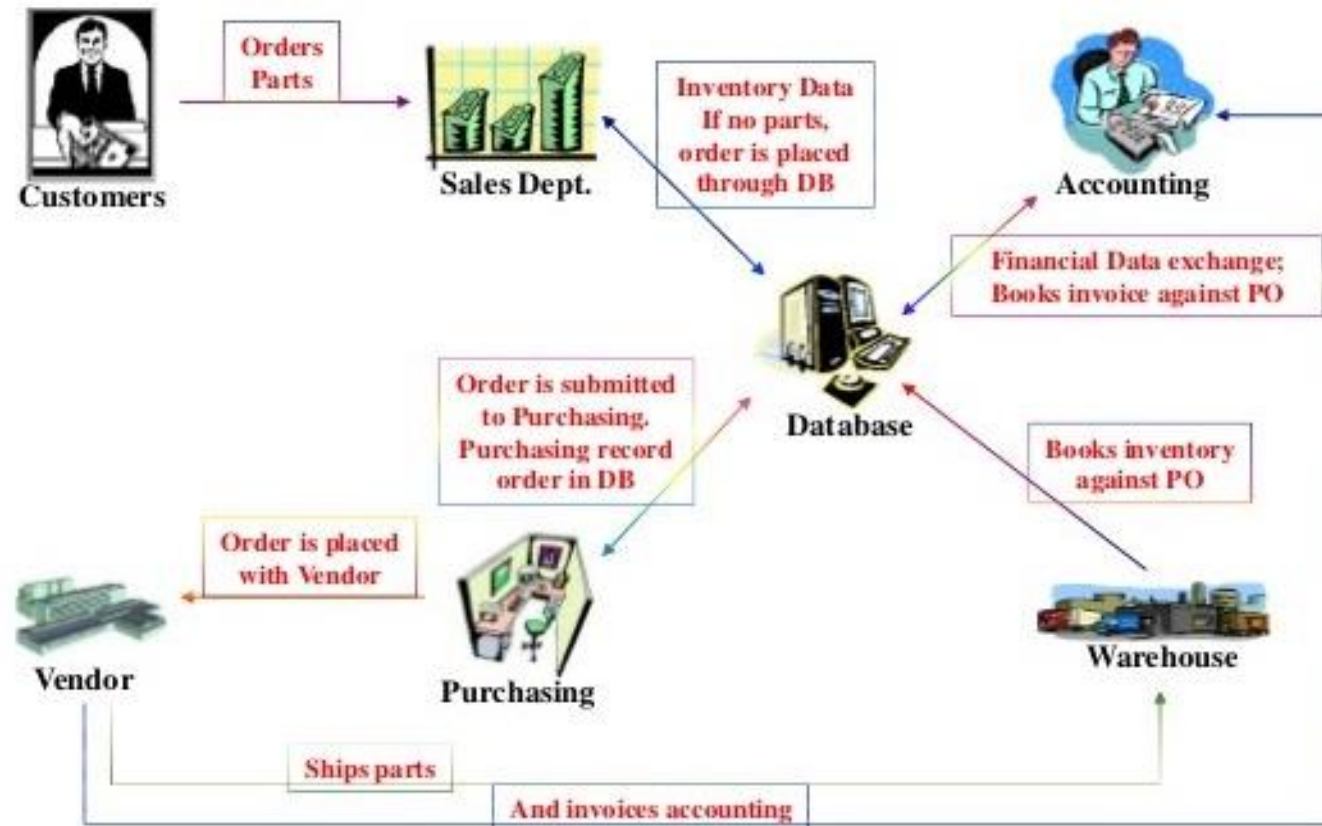
Problems with Decentralized System

- Numerous disparate information system are developed individually over the time.
- Integrating the data becomes time and money consuming. Inconsistences and duplication of data.
- High inventory, material and human resource cost.

Benefits of Centralized System

- Eliminates the duplication, discontinuity and redundancy in data.
- Provides information across departments in real time.
- Provides control over various business processes.
- Increase Productivity, better inventory management, promotes quality, reduced material cost, boosts profits.
- Better Customers interaction, increased throughput, improves customer services.

Centralized ERP System



Centralized System : Key observation

- Data is maintained at a central location and is shared with various Departments.
- Departments have access information/data of the other Departments

ERP Application Components

17



Financial Management

- At the core of ERP are the financial modules, including general ledger, accounts receivable, accounts payable, billing and fixed asset management. If your organization is considering the move to an ERP system to support expansion into global markets, make sure that multiple currencies and languages are supported, as well as regulatory compliance in the U.S. and in foreign countries.
- Other functionality in the financial management modules will include budgets, cash-flow, expense and tax reporting. The evaluation team should focus on areas that are most important to support the strategic plans for your organization.

Business Intelligence

Business Intelligence (BI) has become a standard component of most ERP packages. In general, BI tools allow users to share and analyse the data collected across the enterprise and centralized in the ERP database. BI can come in the form of dashboards, automated reporting and analysis tools used to monitor the organizational business performance. BI supports informed decision making by everyone, from executives to line managers and accountants.

Supply Chain Management

Supply Chain Management (SCM), sometimes referred to as logistics, improves the flow of materials through an organization by managing planning, scheduling, procurement, and fulfillment, to maximize customer satisfaction and profitability. Sub modules in SCM often include production scheduling, demand management, distribution management, inventory management, warehouse management, procurement and order management..

Human Resource Management

Human resource management ERP modules should enhance the employee experience –from initial recruitment to time tracking. Sub modules can include payroll, performance management, time tracking, benefits, compensation and workforce planning. Self-service tools that allow managers and employees to enter time and attendance, choose benefits and manage PTO are available in many ERP solutions.

Manufacturing Operations

Manufacturing modules make manufacturing operations more efficient through product configuration, job costing and bill of materials management. ERP manufacturing modules often include Capacity Requirements Planning, Materials Requirements Planning, forecasting, Master Production Scheduling, work-order management and shop-floor control

ERP Components

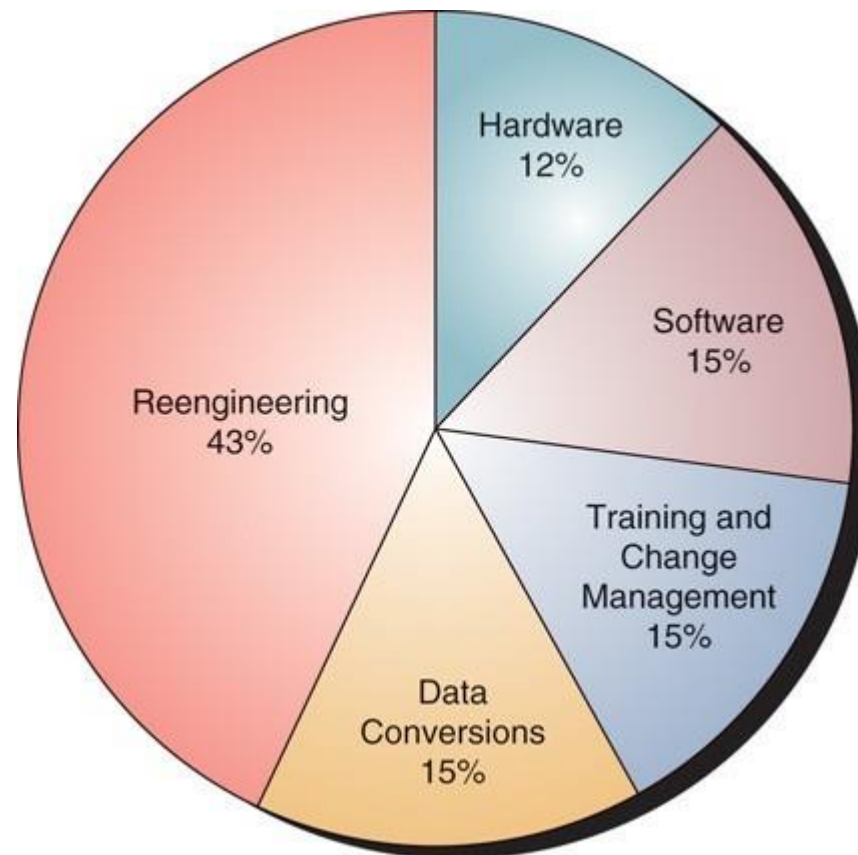
23

Integration

Key to the value of an ERP package is the integration between modules, so that all of the core business functions are connected. Information should flow across the organization so that it reports on organization-wide results.

Costs of ERP

24



High Level Summary Costs of 3 Different On-Premise Scenarios

3 CONCURRENT USERS

FINANCIAL MODULES ONLY

- This scenario is about \$20,000-\$30,000 (software & implementation services. Hardware is extra).

7-10 CONCURRENT USERS

FINANCIALS, SALES & INVENTORY FUNCTIONALITY

- This scenario is about \$60,000-\$90,000 (software & implementation services. Hardware is extra).

12-15 CONCURRENT USERS

FINANCIALS, SALES, INVENTORY FUNCTIONALITY

- This scenario is about \$120,000-\$180,000 (software & implementation services. Hardware is extra).

ERP Project and Time

26

- Real transformational ERP efforts will usually run between 1 to 3 years, on average.
- Short implementations (3 to 6 months) can be achieved for small companies or if implementation is limited to a small area of the company, or if the company only used the financial pieces of the ERP system.
- The important thing is not to focus on how long it will take but to understand why you need ERP and how you will use it to improve your business.

Hidden Costs of ERP

27

Training

Integration and
testing

Data conversion

Data analysis

Consultants

Replacing best
and brightest
staff after
implementation

Implementation
teams can never
stop

Waiting for ROI

Post-ERP
depression

Benefits of ERP Systems

28



- Improving integration, flexibility
- Fewer errors
- Improved speed and efficiency
- More complete access to information
- Lower total costs in the complete supply chain
- Shorten throughput times
- Sustained involvement and commitment of the top management

Benefits of ERP Systems

29

Reduce Stock To A Minimum

Enlarge Product Assortment

Improve Product Quality

Provide More Reliable Delivery Dates And Higher Service To The Customer

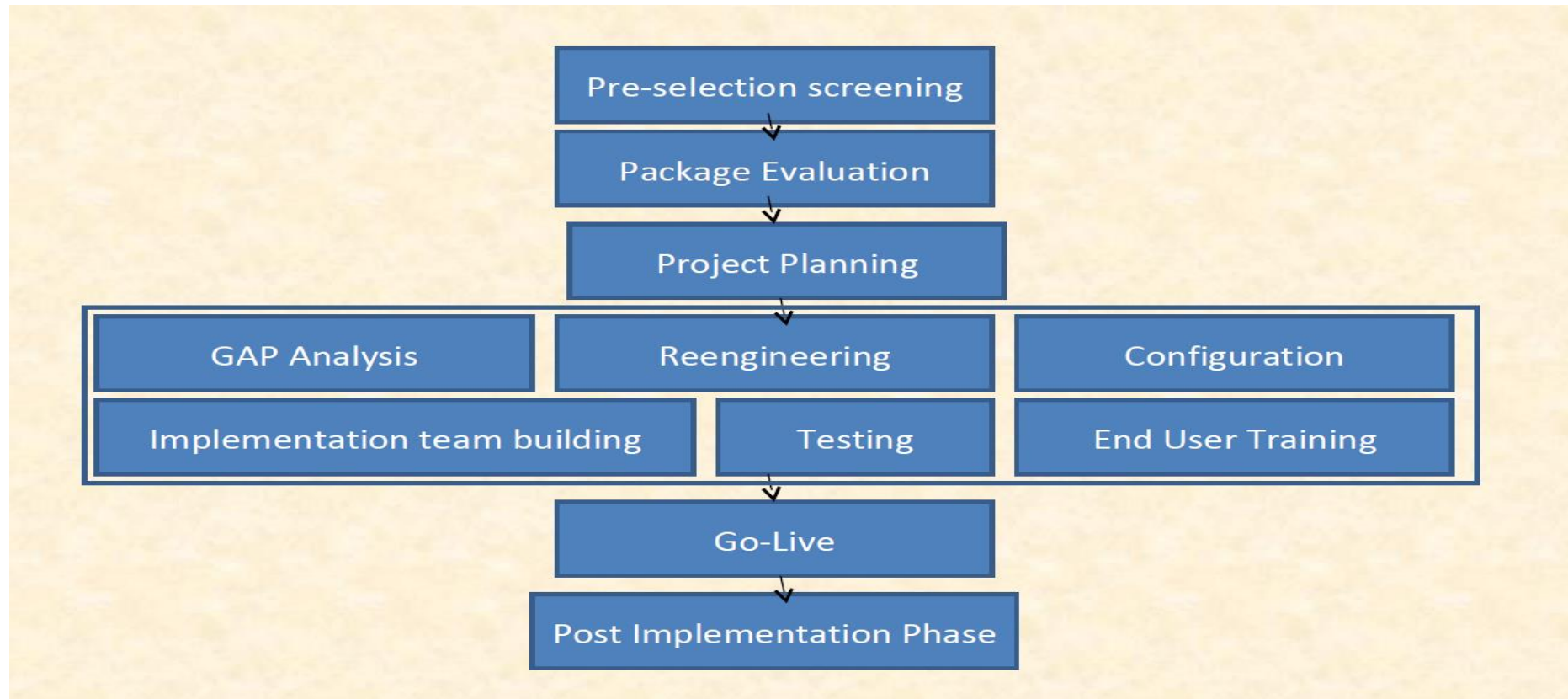
Efficiently Coordinate Global Demand, Supply And Production

Drawbacks of ERP System

- ▶ The cost of ERP Software, planning, customization, configuration, testing, implementation, etc. is too high.
- ▶ ERP deployments are highly time-consuming – projects may take 1-3 years (or more) to get completed and fully functional.
- ▶ Too little customization may not integrate the ERP system with the business process & too much customization may slow down the project and make it difficult to upgrade.
- ▶ The cost savings/payback may not be realized immediately after the ERP implementation & it is quite difficult to measure the same.

ERP Implementation Life Cycle

31



MAJOR PHASES
OF
IMPLEMENTATION

Concept/initiation

Development

Implementation

Closeout/Operation and maintenance

Implementation

Expensive (can costs 100 thousands to millions of dollars)

Time-consuming (can take months to years)

Great risk for the organization

Transfer of Knowledge Acceptance with the company

Causes of ERP Failures

34

Business managers and IT professionals underestimate the complexity of the planning, development, and training needed

Failure to involve affected employees in the planning and development phases

Trying to do too much too fast in the conversion process

Failure to do enough data conversion and testing

Best Practices of ERP Implementation

Change
Management

Extensive
Education And
Training

Data Clean Up
And Data
Integrity

Implementation
Is Viewed As An
Ongoing
Process

Best Practices of ERP Implementation

Change Management

- Changes in business procedures, responsibilities, work load. As a result, ERP implementations are times of high stress, long hours, and uncertainty.
- Mid-level managers must facilitate continual feedback from employees, provide honest answers to their questions, and help resolve their problems.

Best Practices of ERP Implementation

Extensive Education and Training

- General education about the ERP system for everyone.
- Massive amount of end users training before and during implementation.
- Follow-up training after the implementation.
- 10 to 15% of total ERP implementation budget for training will give an organization an 80% chance of a successful implementation.

Best Practices of ERP Implementation

Data Clean up and Data Integrity

- Clean-up data before cut-over.
- “Near enough is no longer good enough.”
- To command trust, the data in the system must be sufficiently available and accurate.
- Eliminate the old systems, including all informal systems.

Best Practices of ERP Implementation

Implementation is viewed as an ongoing process

- Ongoing need for training and software support after implementation.
- Ongoing need to keep in contact with all system users and monitor the use of the new system.
- Ongoing process of learning and adaptation that continually evolves overtime.

Main ERP vendors

40

- ERP Market consists of the big 4 vendors (Sap, Oracle PeopleSoft, Baan, JD Edwards) and others.
- The big 4 account for 61% of the market share.

ORACLE
PeopleSoft®

SAP

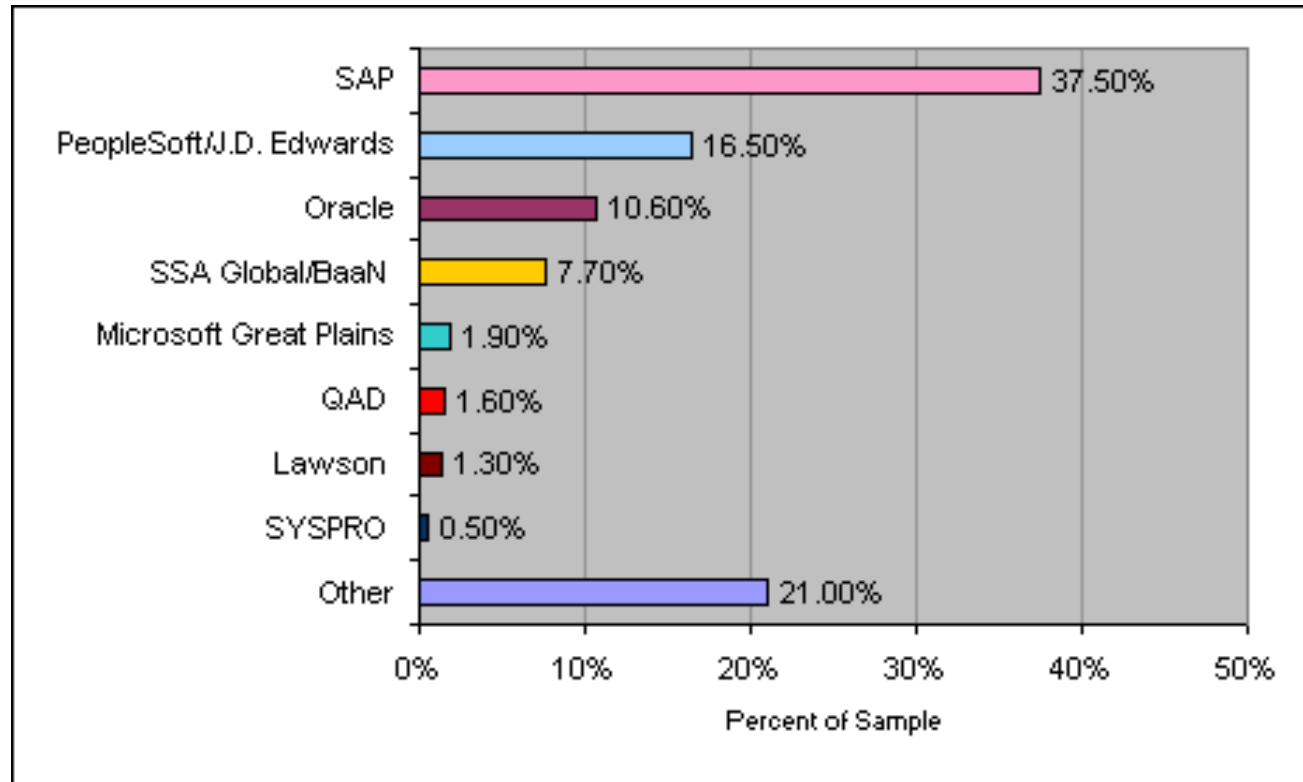
 Microsoft Dynamics

SIEBEL
IT'S ALL ABOUT THE CUSTOMER™

invensys
Baan


J D E D W A R D S

Market Analysis of ERP Vendors



ORACLE PEOPLESOFT

- Oracle's Warehouse Technology Initiative provides customers with a complete data warehousing solution.
- Oracle's Integrated Business Intelligence Solutions deliver powerful capabilities to users anywhere in the enterprise, at any time. Products include Oracle Reports, Oracle's Enterprise Reporting Tool, Oracle Discoverer, Oracle's Query and Analysis tool etc.
- Oracle Applications is a leading provider of packaged and integrated front office ERP solutions for the enterprise follows internet computing model.
- Oracle has 45+ modules divided into following categories
 - Oracle Financials
 - Oracle Human Resource
 - Oracle Projects
 - Oracle Manufacturing
 - Oracle Supply Chain
 - Oracle Front Office



SAP

- SAP (Systems, Applications and products in Data Processing)
- SAP ERP packages come in two versions: the mainframe version (SAP R/2) and the client/server version (SAP R/3)
- SAP products feature a sophistication and robustness unmatched by other business software solutions.
- SAP has developed an extensive library of more than 80 predefined business processes, spanning each functional software requirement.



BAAN

The Baan series-based product family includes Baan Enterprise Resource Planning (Baan ERP), Baan Front Office, Baan Corporate Office Solutions, Baan Supply Chain Solutions etc.

Baan serves a number of industries like Aerospace & Defense and Automotive.

The Baan ERP modules include the following

- Manufacturing
- Finance
- Project
- Distribution



JD EDWARDS

JD Edwards WorldVision is a thin client bridge that provides the Graphical User Interface (GUI) with a look and feel common to the PC, while protecting your investment in WorldSoftware and the AS/400. The different product modules available from JD Edwards are:

- Foundation Suite
- Financial Suite
- Logistics/Distribution Suite
- Services Suite
- Manufacturing Suite
- Architecture, Engineering, Construction, Mining and Real Estate Suite
- Energy and Chemical Suite
- Payroll Suite
- Human Resource Suite
- Customer Service Management Suite
- Government, Education, and Not-for-profit Solutions
- Utility and Energy Solutions



NESTLE CASE STUDY

- 33 manufacturing facilities, 6 distribution centers and 17 sales offices around the country, 17,300 employees nationwide
- Nestle USA's brands were paying 29 different prices for vanilla -to the same vendor.
- Nine different general ledgers and 28 points of customers entry.



NESTLE CASE STUDY

- \$210 million budget
- Five SAP Modules –purchasing, financials, sales and distribution, accounts payable and accounts receivable
- 50 top business executives and 10 senior IT professionals.
- Transforming the separate brands into one highly integrated company.
- Internal aligned and united, establishing a common business process architecture
- Standardizing master data
- The new business process confused most of employees, then resistance into rebellion in 2000.
- Reconstructed in June 2000 and completed in 2001.



NESTLE CASE STUDY

- ▶ Common database and business processes lead to more trustworthy demand forecast.
- ▶ A comprehensive account planning tool.
- ▶ Nestle can now forecast down to the redistribution center level.
- ▶ Nestle has improved forecast accuracy by 2%
- ▶ Higher factories utilization
- ▶ fewer factories = big gains in factories Utilization
- ▶ Reduce inventory level



AGILENT TECHNOLOGY CASE STUDY

- ▶ Oracle's Business Suite software,
- ▶ Started in September 2000 till 2004,
- ▶ Approximately 100 Oracle consultants to install the program
- ▶ "One IT" organization
- ▶ Supply chain capability
- ▶ Migrating 2,200 legacy applications that it inherited from HP to Oracle
- ▶ IT spend was 8-10% of sales
 - ▶ •80% for business operations
 - ▶ •20% maintenance & upgrading Old systems
- ▶ Further autonomy over the IT portfolio would have led to 50% cost increase.



AGILENT TECHNOLOGY CASE STUDY

GOALS

- ▶ To consolidate a large number of independent operating groups into a single worldwide IT function,
- ▶ To share information quickly and efficiently
- ▶ To drive the operational costs down by more than 20%,
- ▶ To combine all IT budgets
- ▶ Migrating from all existing ERP systems to a single Oracle-based infrastructure system
- ▶ The use of bar code for materials received from suppliers
- ▶ The use of Evaluated Receipt Settlement (ERS)
- ▶ Real-time information about inventory and order status,
- ▶ Easier to understand invoicing and pricing,
- ▶ Improved visibility on product delivery lead time.



Agilent Technologies

AGILENT TECHNOLOGY CASE STUDY

PROBLEMS

- ▶ Because of the consolidation of its 2,200 software systems to under 20, confusion meant lost order and revenue
- ▶ Mistakes converting backlog.
- ▶ “The other problem we had was converting backlog from legacy to new systems, especially for our highly configured products in our test and measurement operation.”
- ▶ Extra \$35 million to cover costs of ERP and CRM rollout.
- ▶ ERP implementations are a lot more than software packages.
- ▶ People, processes, policies and culture are all factors that should be taken into consideration when implementing a major enterprise system.
- ▶ ERP disasters are often caused by a user company itself.



Agilent Technologies

INTEGRATED ENTERPRISE APPLICATION

DEFINITION

Enterprise application integration (EAI) is the process of connecting databases and workflows associated with business applications so that the information is used uniformly across the organization and that improvements to core business data made by one application are correctly mirrored in others.

In other words, EAI is defined as “the unrestricted sharing of data and business processes among any connected applications and data sources in the enterprise.”

Defining EAI

53

- Why EAI?
 - The functionality of an Enterprise would be simplified if everyone used the same servers with the same operating system with the same clients.
 - Reality is very diverse. We can expect a mix of mainframes, Windows, UNIX, Linux, VMS, as well as many other systems
 - Getting them to work/share data together is the issue!
 - Using EAI effectively will allow us to integrate without making major changes to our current infrastructure.
- What is EAI?
 - Integrates applications and enterprise data sources so that they can easily share business processes and data
 - Integration is done without significant changes of applications and data sources

OPERATIONS IN AN ENTERPRISE

- ▶ MANUFACTURING

- ▶ PROCESS – SIMPLE/

- ▶ PRODUCTS

- ▶ TOOLS

- ▶ MANUFACTURING OPERATIONS MANAGEMENT EG AIRCRAFT MANUFACTURING

- ▶ STRUCTURE OF MANUFACTURING OPERATION

- ▶ MANUFACTURING CELL CYCLE

- ▶ INTEGRATED MANUFACTURING SYSTEM

- ▶ ASSEMBLING

TYPES OF PRODUCTION

SUPPLY

BASED ON
THE USES

PART
PRODUCTION

HIGH
QUANTITY

UNIQUE
PRODUCTION

MASS
PRODUCTION

TO PUSH THE
PRODUCT

TO PULL THE
PRODUCT

PRODUCTION TASKS

PLACE OF
PRODUCTION

TECHNOLOGY TO BE
USED

SURVEYING THE
DEMAND

MATERIAL
REQUIREMENT
PLANNING

QUANTITY
REQUIREMENT
PLANNING

IMPLEMENTATION:

- MATERIAL REQUIREMENT
- QUANTITY REQUIREMENT
- PRODUCTION MONITORING AND TRACKING

ORGANIZATIONAL REQUIREMENTS

PRODUCT
DESIGN AND
TECHNOLOGY

PRODUCTION
PROCESS
PLANNING

QUALITY
INSPECTION
AND CONTROL

PIECE
PRODUCTION

CONTROLLING OPERATIONS

PRODUCTION CONTROL

- PLANNING
- MATERIAL REQUIREMENTS
- OPERATIONAL PROGRAM
- LOAD ON PRODUCTION EQUIPMENT
- MANUFACTURING PROCESS INITIATION

WORKSHOP LEVEL CONTROL

- WORK COSTS, PAYMENTS
- MATERIAL COSTS
- EVENT SUCCESS/FAILURE

Architectures

59

1 Layer Architecture

Monolithic information systems

Presentation, application logic, and resource management were merged into a single tier

2 Layer Architecture

Separation of presentation layer from other 2 layers (app + resource)

Became popular as 'server/client' systems

3 Layer Architecture

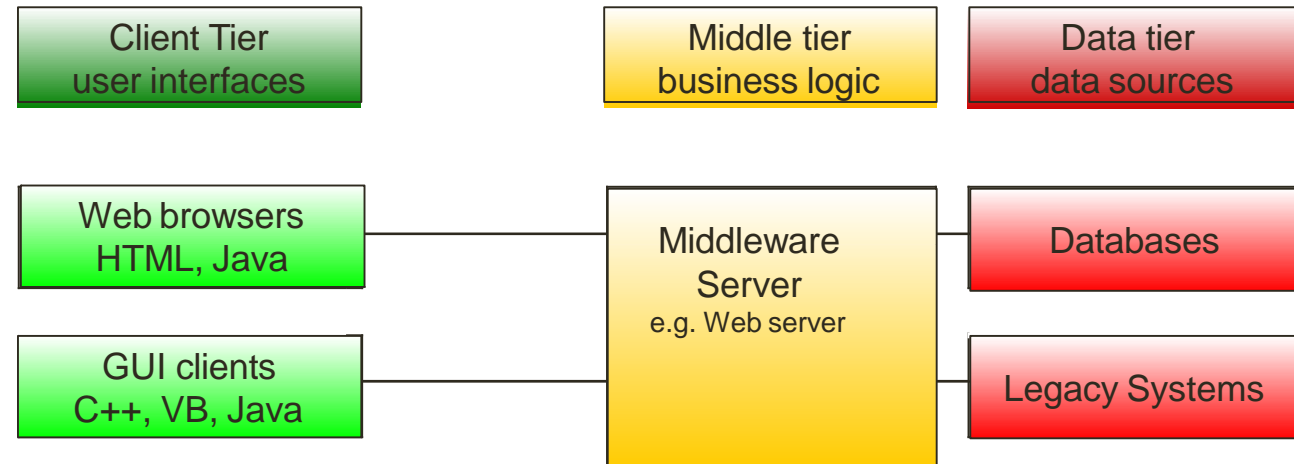
Can be achieved by separating Resource Management from application logic layer

Multi-tier Architectures

- In software engineering, multitier architecture, often referred to as n -tier architecture is a client-server architecture in which presentation, application processing, and data management functions are physically separated.
- The most widespread use of multitier architecture is the three-tier architecture.

Multi-tier Architectures

- Business Logic is applied in the middle tier, and is Independent of the rest of the tiers.
- Data-tier application is a logical database management entity that defines all of the SQLServer objects - like tables, views, and instance objects



Middleware

Allows
communication

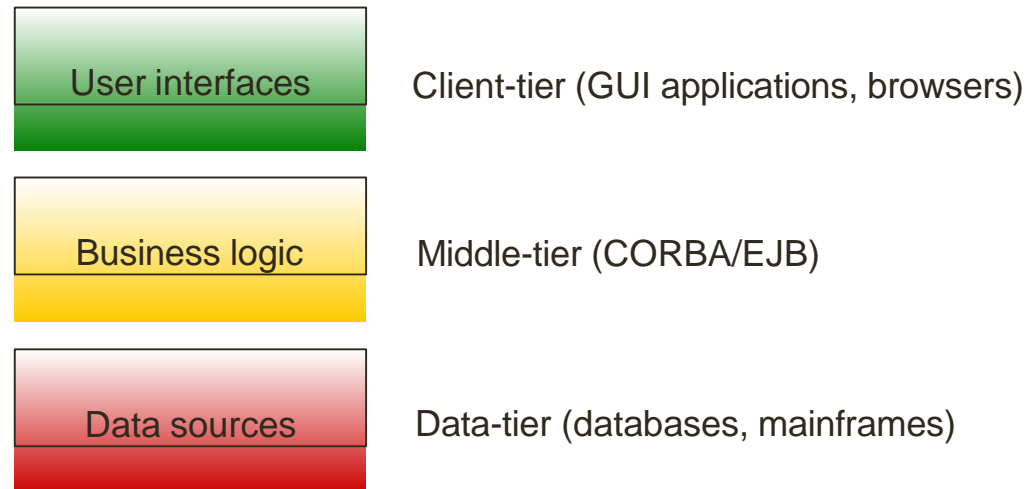
- Through a standard language
- Across different platforms
- Between legacy and modern applications

Takes care of

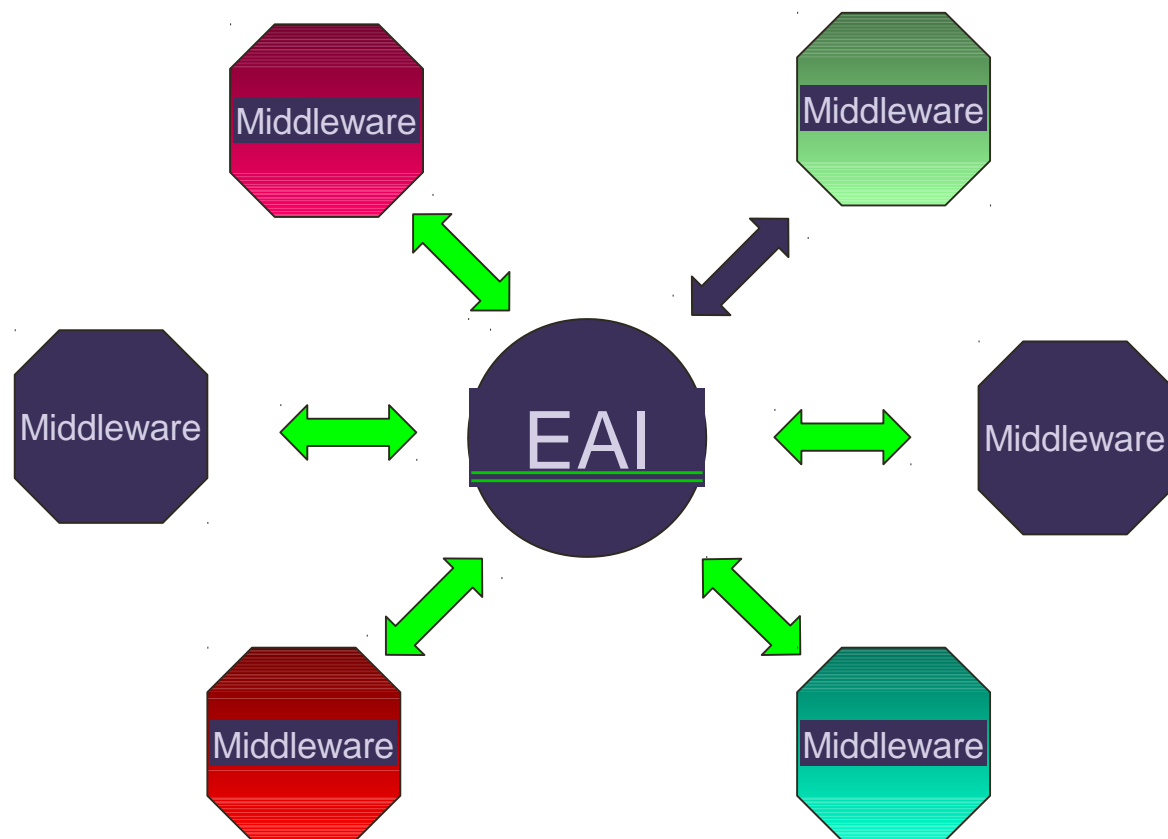
- Transactions between servers
- Data conversion
- Authentication
- Communications between computers

Middleware

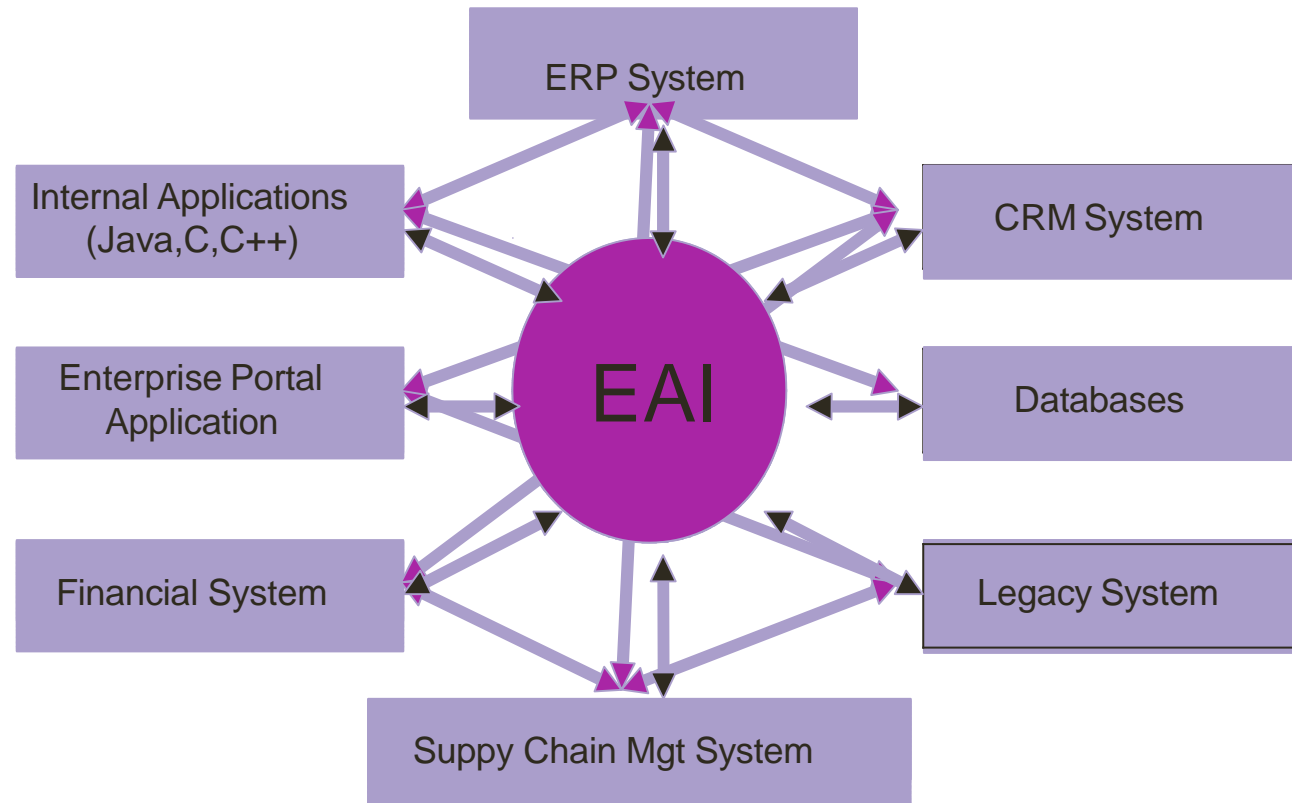
- ▶ Main use today: covering thin client architectures (heavily server dependent)
- ▶ Common Object Request Broker Architecture (CORBA) is used in Middleware during implementation
- ▶ CORBA enables communication between software written in different languages and running on different computers.
- ▶ EJB (Enterprise JavaBeans) is a subset of the Java EE specification that achieves the same goals as CORBA.



MIDDLEWARE AND EAI



EAI IN IMPLEMENTATION



EAI BENEFITS:

- Lower development costs
 - Integration is simpler because systems are more loosely coupled than in object brokers
- Lower opportunity costs
 - Integration is done more quickly
 - corresponding cost savings reached sooner
- Lower maintenance effort
 - adapters extract the interaction with external systems
 - significant advantage from the software engineering point of view

Conclusion

ERP:

- Reduction on inventory costs; Reduction on raw material costs.
- Lead-time for customers, production time, and production costs can be reduced.
- Drawback is that the cost of implementing can be quite high and risks are great.

EAI:

- Enterprises integrate their applications
- They are less expensive than replacement
- They are more efficient than information islands
- Enterprises must establish web-presence and make business services available to web-clients

Thank You