ERP Fundamental

Presented by:

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Introduction

- Modern organizations are considered highly complex networks of business units

- Each business unit realizes a part of the organization's business process

- Complexity of business tasks requires computing power

- A common approach: tackle the business process objectives each unit accomplishes with an IT platform

- A common problem: a different IT platform for each unit

Definition

ERP is **complete enterprise wide business software solution**. The ERP system consists of software support modules, such as: marketing and sales, fields service, product design and development, production and inventory control, procurement, distribution, industrial facilities management, process desig and development, manufacturing, quality, human resources, finance and accounting, and information services.

" Travis Andereg-2002"

Definition

ERP system are **computer based system designed to process an organization's transactions and facilitate integrated and real time planning**, production, and customer response. In particular ERPsystems will be assumed to have certain characteristics.
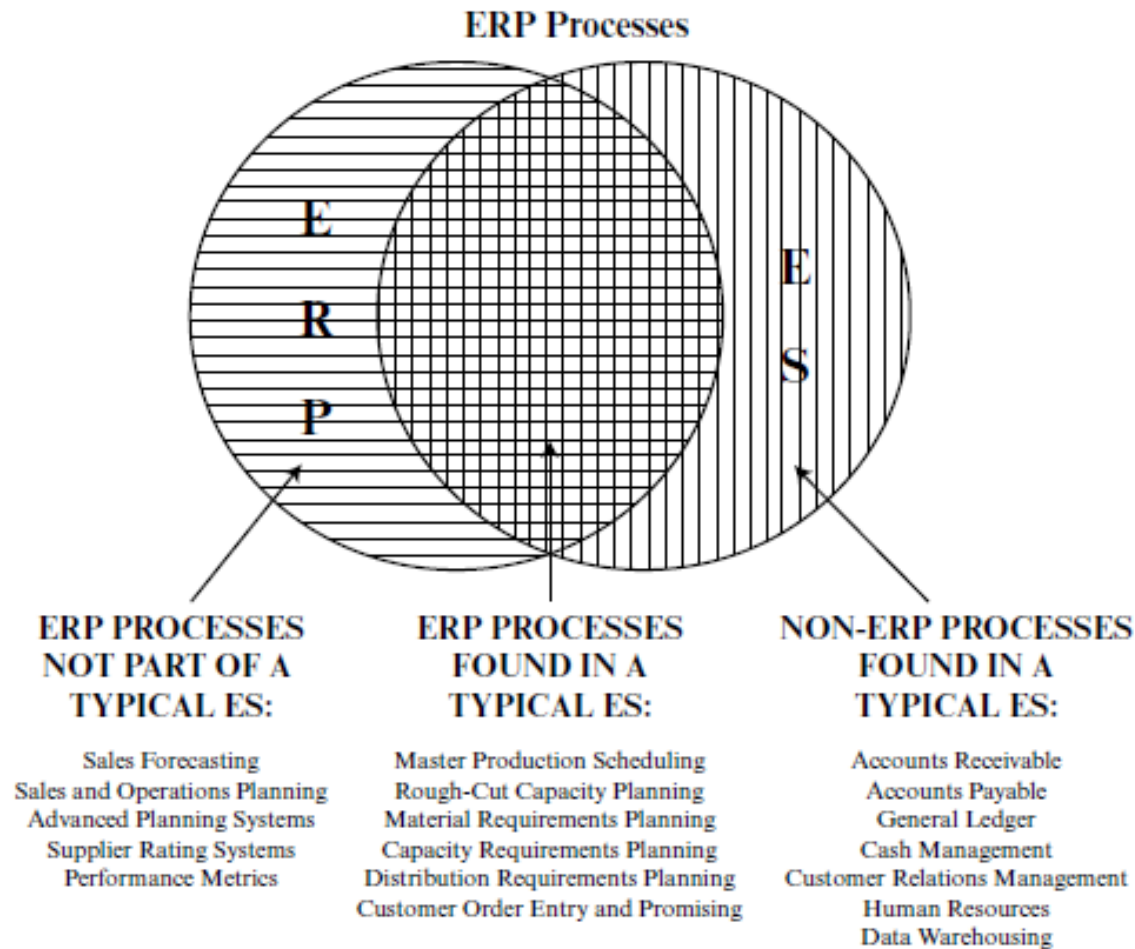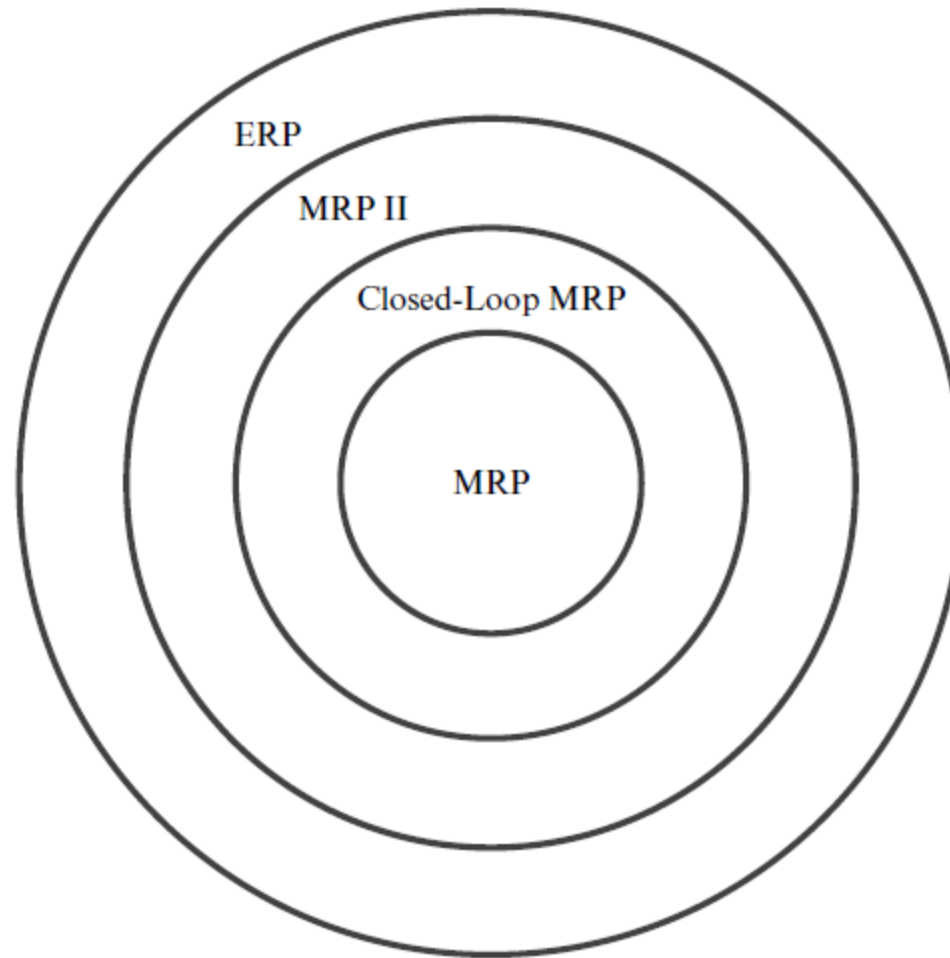
" Daniel O'Leary 2004"

Definition

ERPs integrate (ot attempt to integrate**) all data and processes of an organization into a single unified system**. A typical ERP system will **use multiple component of computer software and hardware to achieve the integration**. A key ingredient of most ERP system is the use of a single, unified database to store data for the various system modules.

" Wikipedia"

ERP Process

ERP Processes

ERP PROCESSES NOT PART OF A TYPICAL ES:

Sales Forecasting
Sales and Operations Planning
Advanced Planning Systems
Supplier Rating Systems
Performance Metrics

ERP PROCESSES FOUND IN A TYPICAL ES:

Master Production Scheduling
Rough-Cut Capacity Planning
Material Requirements Planning
Capacity Requirements Planning
Distribution Requirements Planning
Customer Order Entry and Promising

NON-ERP PROCESSES FOUND IN A TYPICAL ES:

Accounts Receivable
Accounts Payable
General Ledger
Cash Management
Customer Relations Management
Human Resources
Data Warehousing

ERP Evolution

Resource Planning in Enterprises

MRP

Material Requirements Planning
- Bill of material, inventory data, master production schedule
- calculates material requirements and schedules

MRP II

Manufacturing Resource Planning
- based on MRP
- computerised method for simultaneous planning the use of all resources in a company, including financials, manufacturing, and distribution management
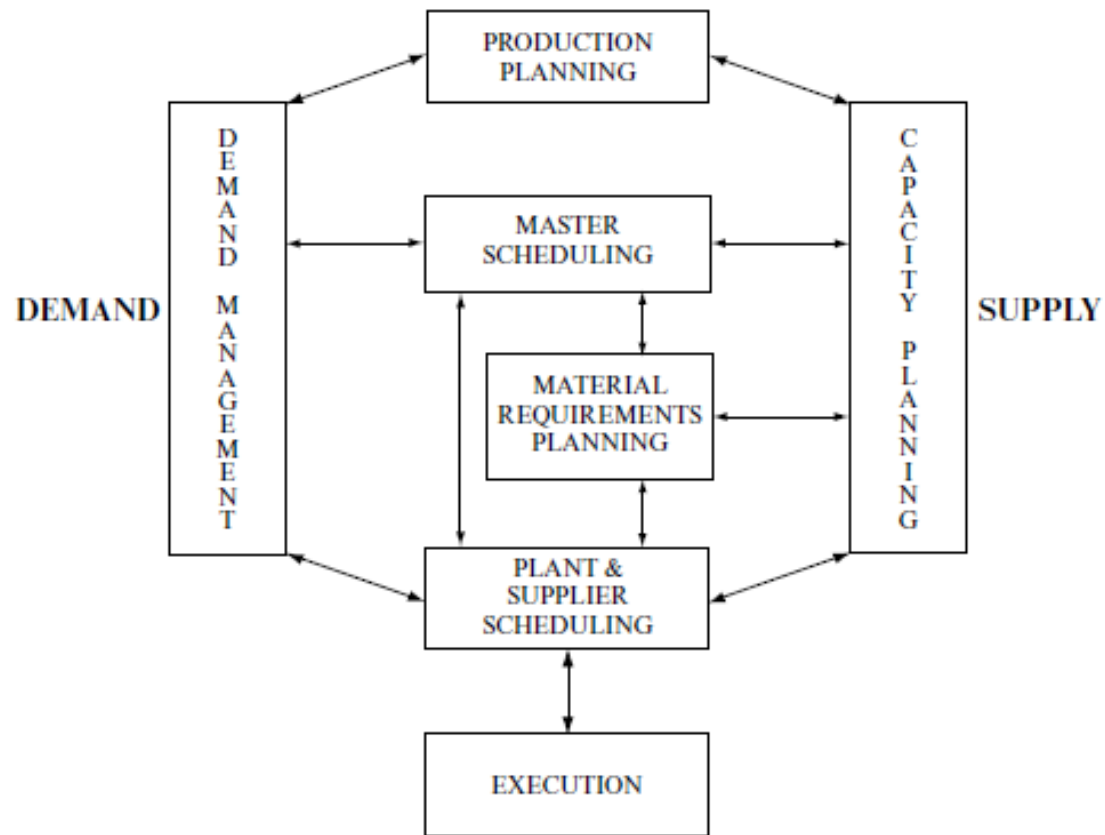
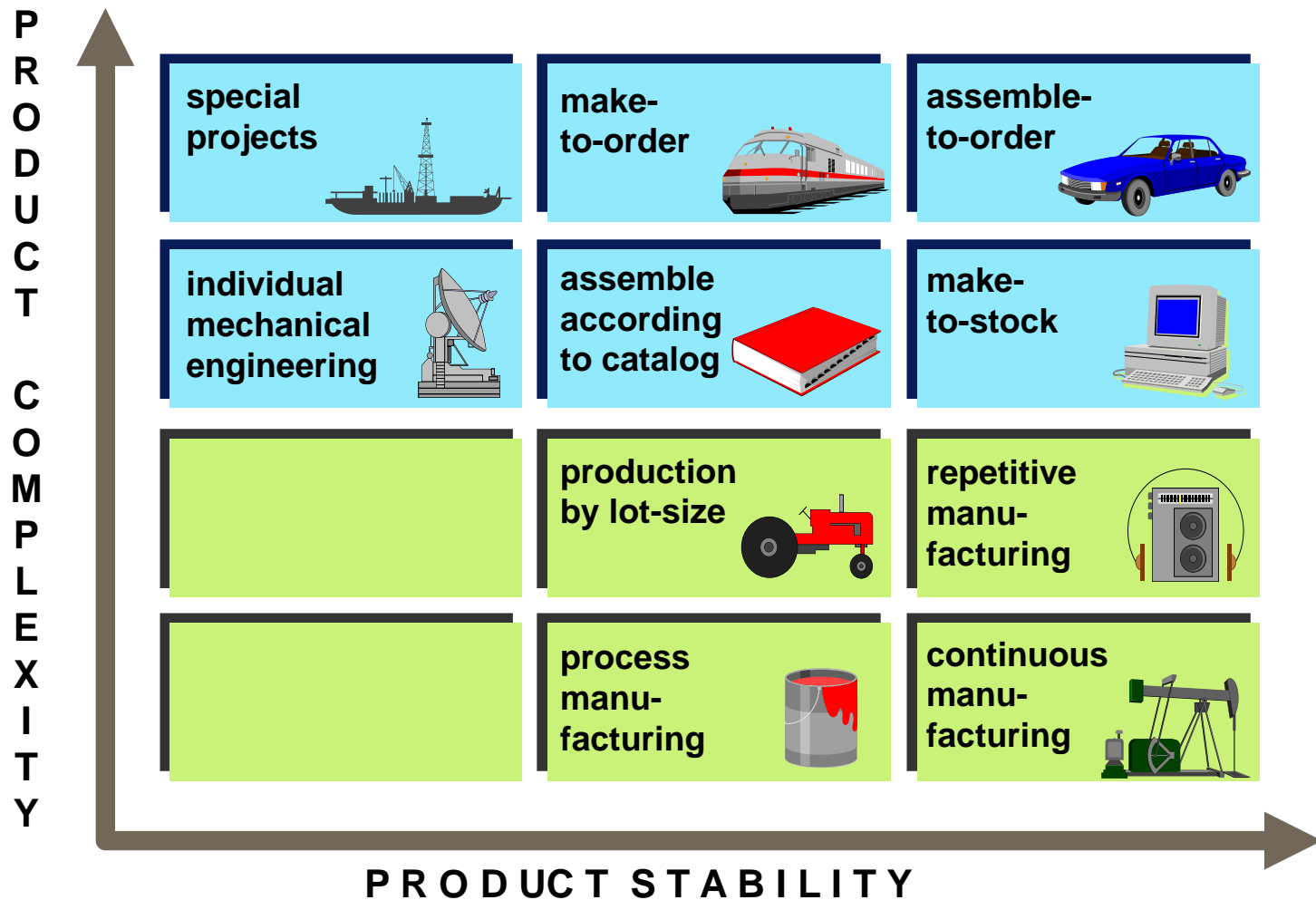**ERP**

Enterprise Resource Planning
- extension of the manufacturing resources planning
- automate and integrate business and production management processes in a real-time environment
- closely associated with the use of client/server technology for greater flexibility in operation and modelling of the enterprise

Closed Loop MRP

Manufacturing Scope

Integrated PPIC System

Overview

CIM

CAD/CAE
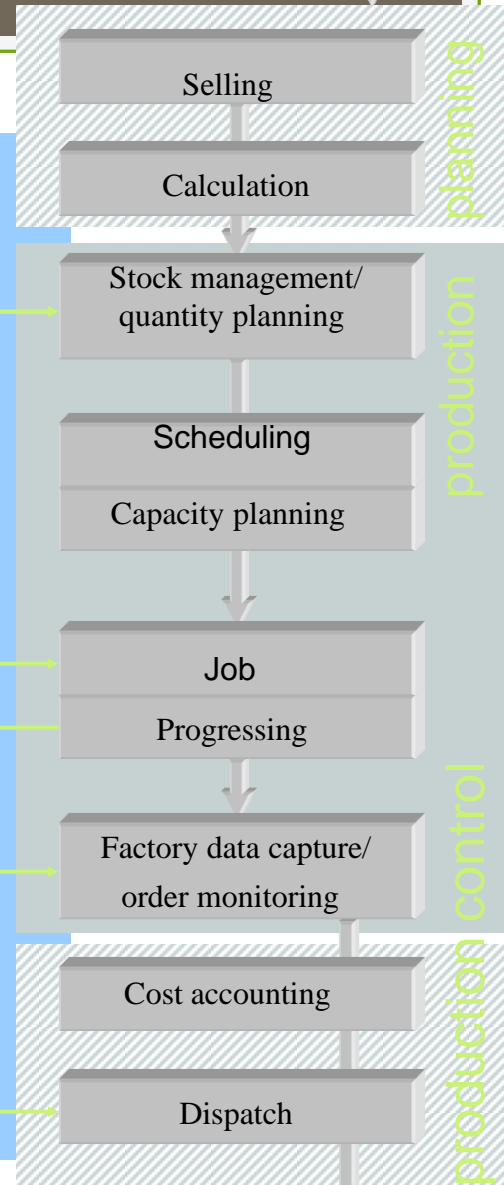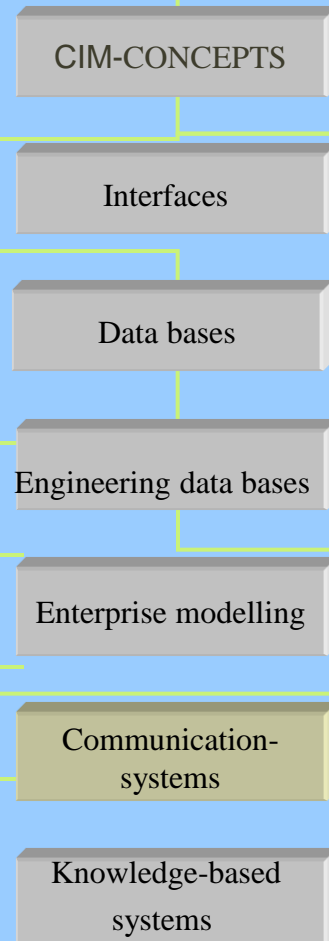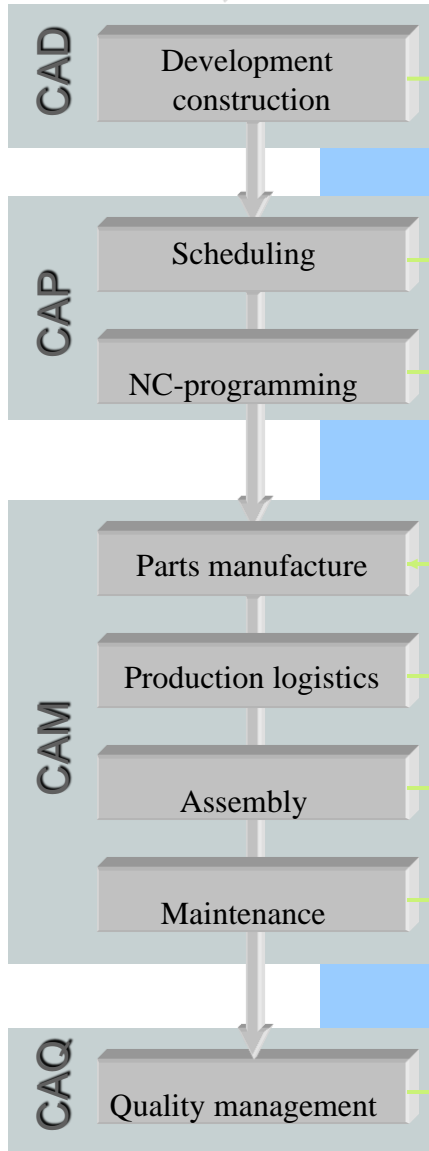
CAP

CAM

PPC

CAQ

Interfaces

Data bases

Engineering
data bases

Enterprise
modeling

Communication

Knowledge-
based systems

product-oriented process chain

order-oriented process chain

planning

production

production control

CAD — Development construction

CAP — Scheduling / NC-programming

CAM — Parts manufacture / Production logistics / Assembly / Maintenance

CAQ — Quality management

CIM-CONCEPTS

Interfaces

Data bases

Engineering data bases

Enterprise modelling

Communication-systems

Knowledge-based systems

Selling

Calculation

Stock management/ quantity planning

Scheduling

Capacity planning

Job

Progressing

Factory data capture/ order monitoring

Cost accounting

Dispatch

Generic Framework Enterprise Functionality

1 Enterprise management		
Strategic management	Strategic planning	Category planning
Portfolio management	Profit management	Innovation management
Business risk management	Business intelligence	Business analytics
	Strategic partner management	

2 Financial management		
Financial accounting	Management accounting	Product costing
Accounts receivable	Accounts payable	Product pricing
Bookkeeping	Budget planning	Budget execution
Financial forecasting	Financial reporting	Salary management
Financing	Banking	Auditing

3 Asset management		
Capital budget management	Fixed asset management	Asset planning
Asset lifecycle management	Real estate management	Asset analysis

4 Human resource management		
Recruitment	Candidate selection	Placement and orientation
Employee development/training	Human resource planning	Incentive management
Time management	Administration	HR quality management

Generic Framework Enterprise Functionality

	5 Business development	
Financing source management	Alignment of business development with marketing	
Liaison with strategic partners	Business model management	Product/service positioning
Influential source management	Research into business development/ channels	

	6 Investment management	
Investment strategy management	Investment portfolio management	Investment accounting
Investment monitoring	Investment planning	

	7 Purchasing (acquisition)	
Procurement strategy	Bid planning	Procurement operations management
Requisition management	Procurement contract management	Receiving operations management
Procurement planning Spend analysis	Supplier relationship management	Catalogue management

Generic Framework Enterprise Functionality

8 Supply chain management		
Supply chain positioning	Supply network planning	Supply chain timetabling
Resource planning along the supply chain	Delivery/transportation planning	Supply chain operations planning
Supply chain forecasting	Delivery/transportation operations (outsourcing/partners/customers)	Supply chain visibility and tracking

9 Marketing		
Market research and analysis	Product/service/brand marketing	Marketing strategy
Lead management	Customer management	Marketing planning
Advertising management	Trade promotion management	Campaign management
Marketing resource management	Customer incentive management	Customer loyalty management
Product launch management	Product lifecycle management	Churn management
Merchandise categorization		

ERP System

A number of significant merits obtained from the ERP system employment:

- Increase in both quality and quantity of information exchanged

- A common user interface able to allow business users to perform a variety of business tasks without retraining

- Integration – e.g. Time manager perform organizational management tasks and vice versa

- Transparency – e.g. Employees could be served by more than one end points
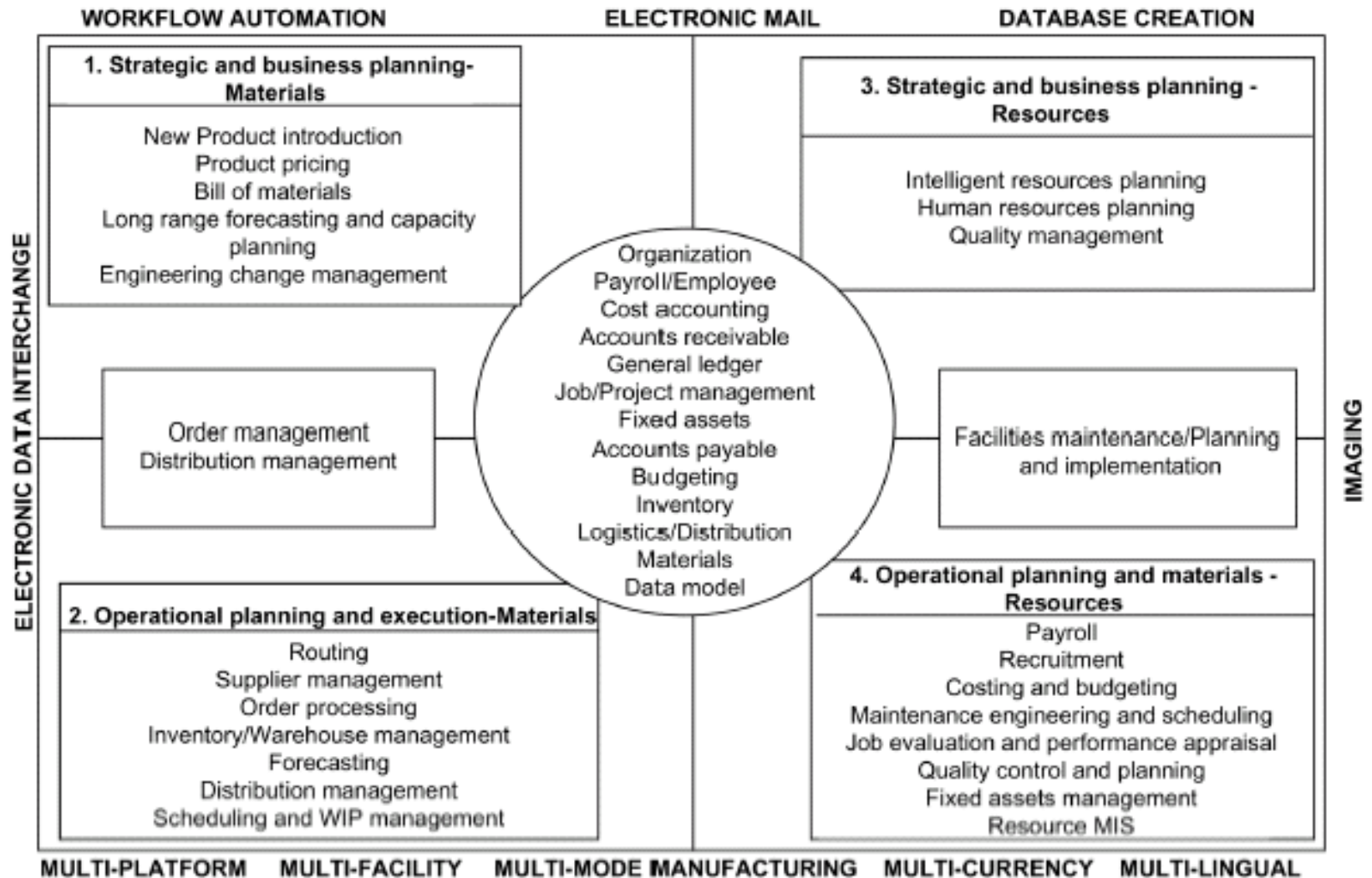
Modules of ERP

ERP would be balancing the resources of an enterprise like manpower, machines, materials, methods, money and marketing to stay competitive in a globalized economy.

The various modules of ERP include :
→ engineering data control
  (*bill of materials, process plan and work centre data*);
→ sales, purchase and inventory
  (*sales and distribution, inventory and purchase*);
→ material requirement planning (MRP);
→ resource flow management
  (*production scheduling, finance and human resources management*);
→ works documentation (*work order, shop order release, material issue release and route cards for parts and assemblies*);
→ shop floor control and management;
→ and others like costing, maintenance management, logistics management and MIS.
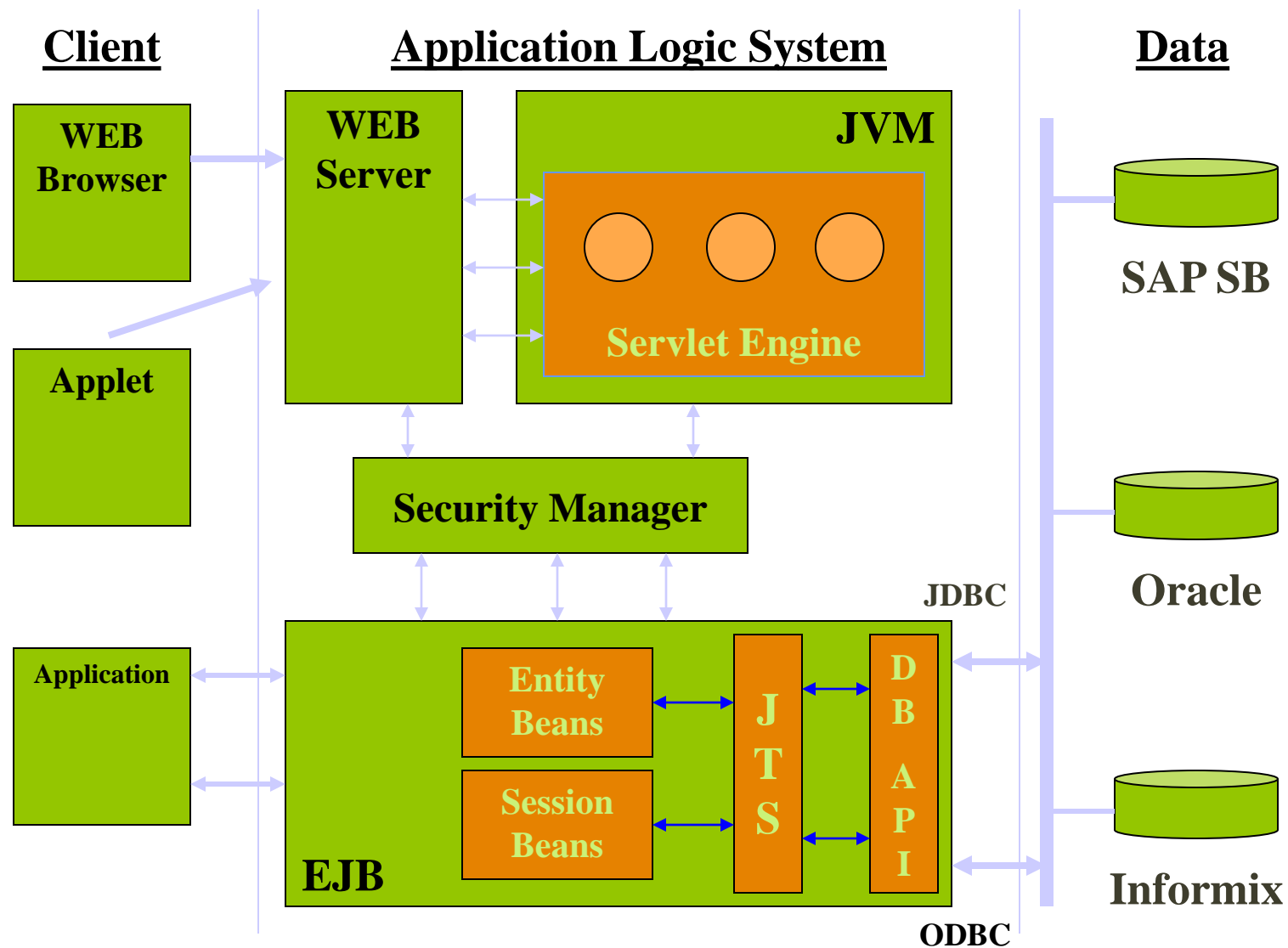
General Model of ERP System

WORKFLOW AUTOMATION   ELECTRONIC MAIL   DATABASE CREATION

ELECTRONIC DATA INTERCHANGE

IMAGING

1. Strategic and business planning-Materials

New Product introduction
Product pricing
Bill of materials
Long range forecasting and capacity planning
Engineering change management

3. Strategic and business planning - Resources

Intelligent resources planning
Human resources planning
Quality management

Order management
Distribution management

Organization
Payroll/Employee
Cost accounting
Accounts receivable
General ledger
Job/Project management
Fixed assets
Accounts payable
Budgeting
Inventory
Logistics/Distribution
Materials
Data model

Facilities maintenance/Planning and implementation

2. Operational planning and execution-Materials

Routing
Supplier management
Order processing
Inventory/Warehouse management
Forecasting
Distribution management
Scheduling and WIP management

4. Operational planning and materials - Resources

Payroll
Recruitment
Costing and budgeting
Maintenance engineering and scheduling
Job evaluation and performance appraisal
Quality control and planning
Fixed assets management
Resource MIS

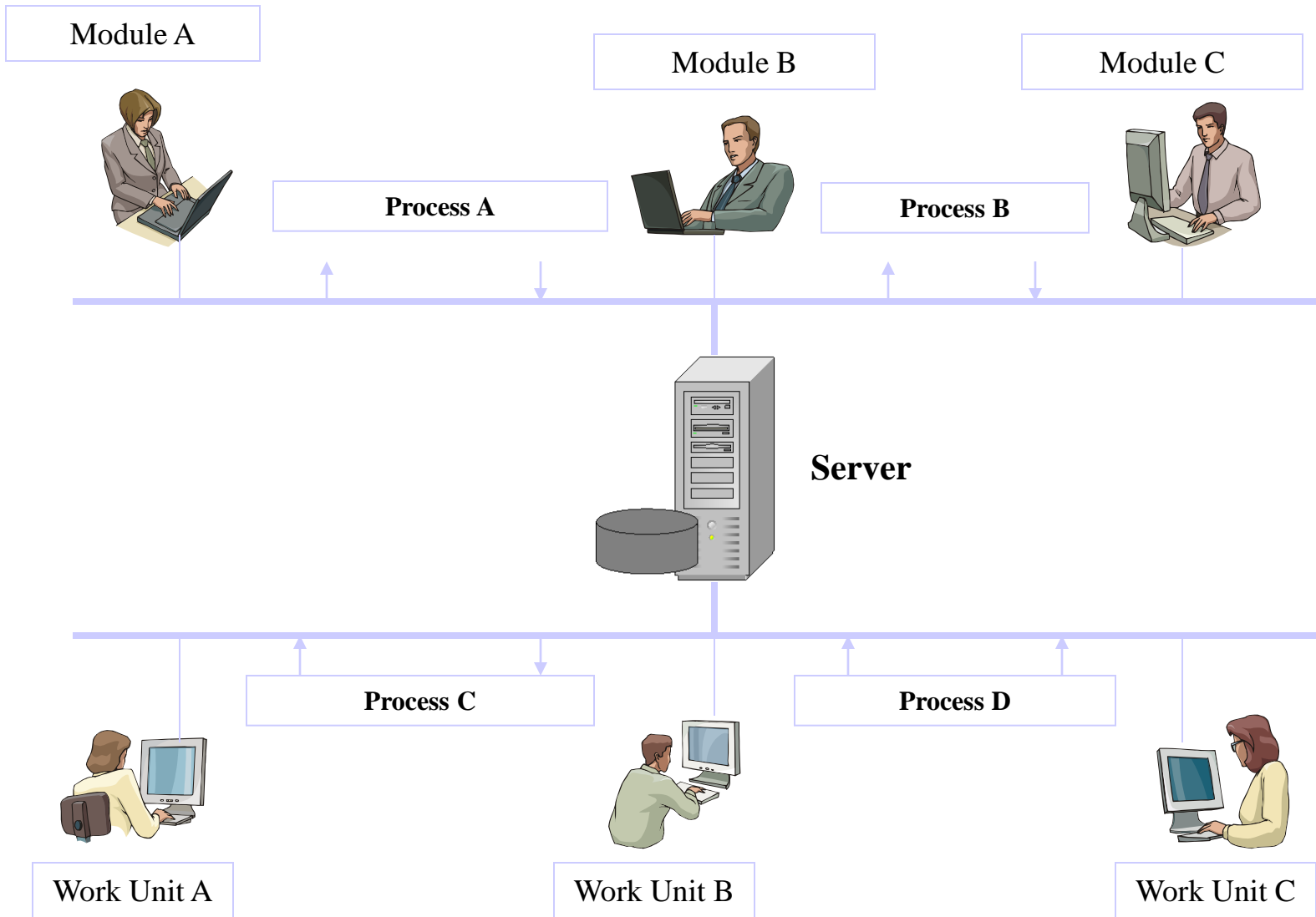MULTI-PLATFORM   MULTI-FACILITY   MULTI-MODE MANUFACTURING   MULTI-CURRENCY   MULTI-LINGUAL

Infrastructure for ERP

- Almost all ERP vendors provide tools to determine the kind of computer infrastructure required, called sizing tools such as CPU, memory, disk and other configurations required for a given number of active users.

- The client/server architecture became very popular and several enterprises consider it a de facto standard.

- Network either at the local area network (LAN) or at wide area network (WAN).
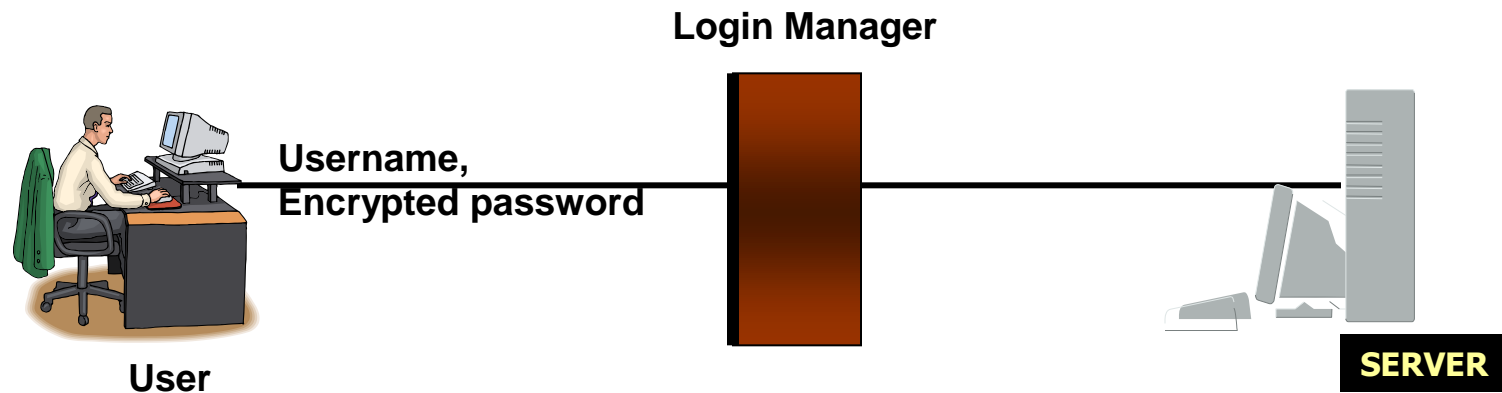
An Example of Client-Server ERP System

Client

Application Logic System

Data

WEB Browser

Applet

Application

WEB Server

JVM

Servlet Engine

Security Manager

EJB

Entity Beans

Session Beans

J T S

D B A P I

JDBC

ODBC

SAP SB

Oracle

Informix

An Example of Networking ERP System

Module A

Module B

Module C

Process A

Process B

Server

Process C

Process D

Work Unit A

Work Unit B

Work Unit C

An Example of ERP Security System

Login Manager

**Username,
Encrypted password**

User

SERVER

- *Authentication*

- *Authorization*

- *Encryption Data*

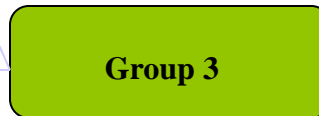# An Example of Authorization ERP System 1/2
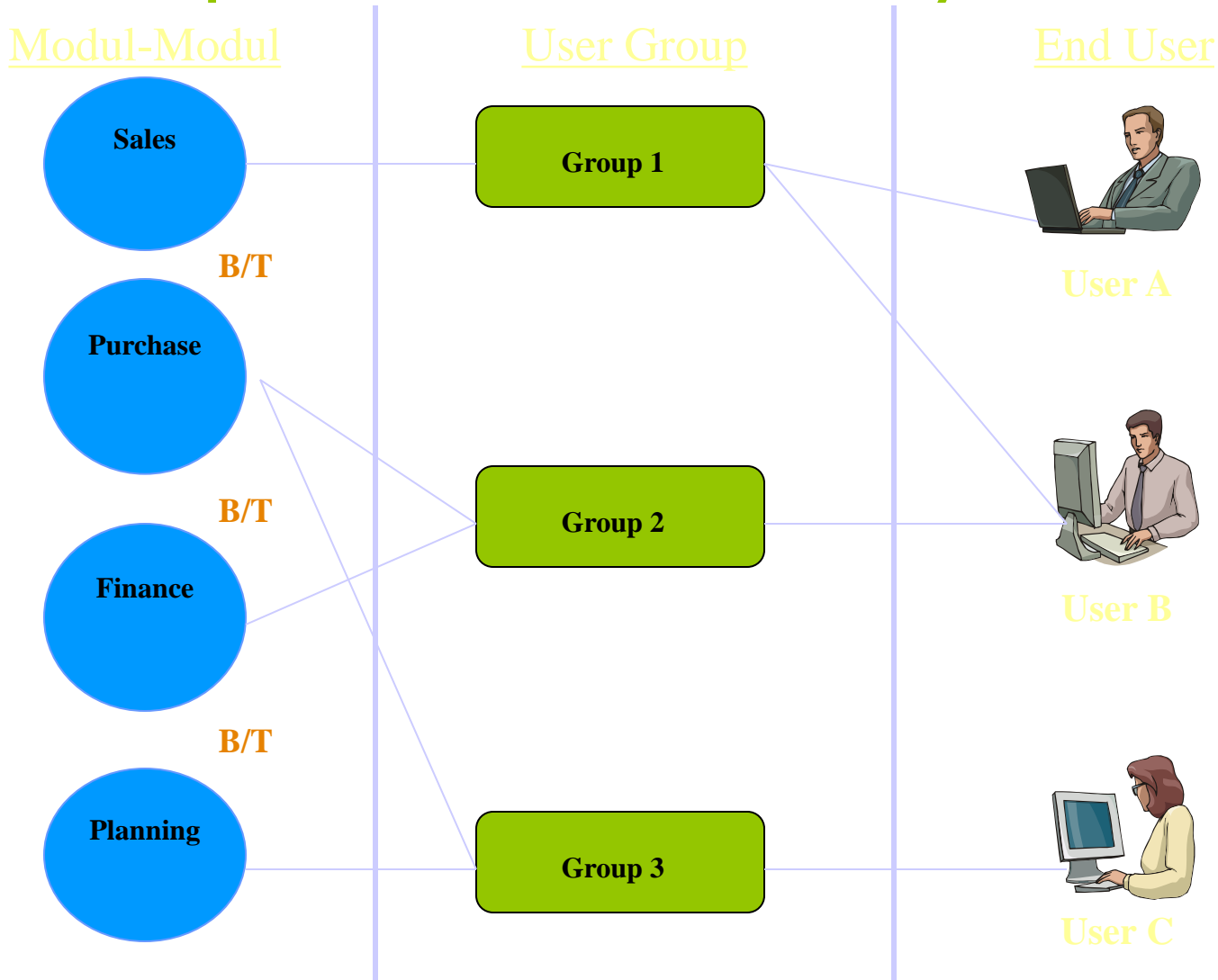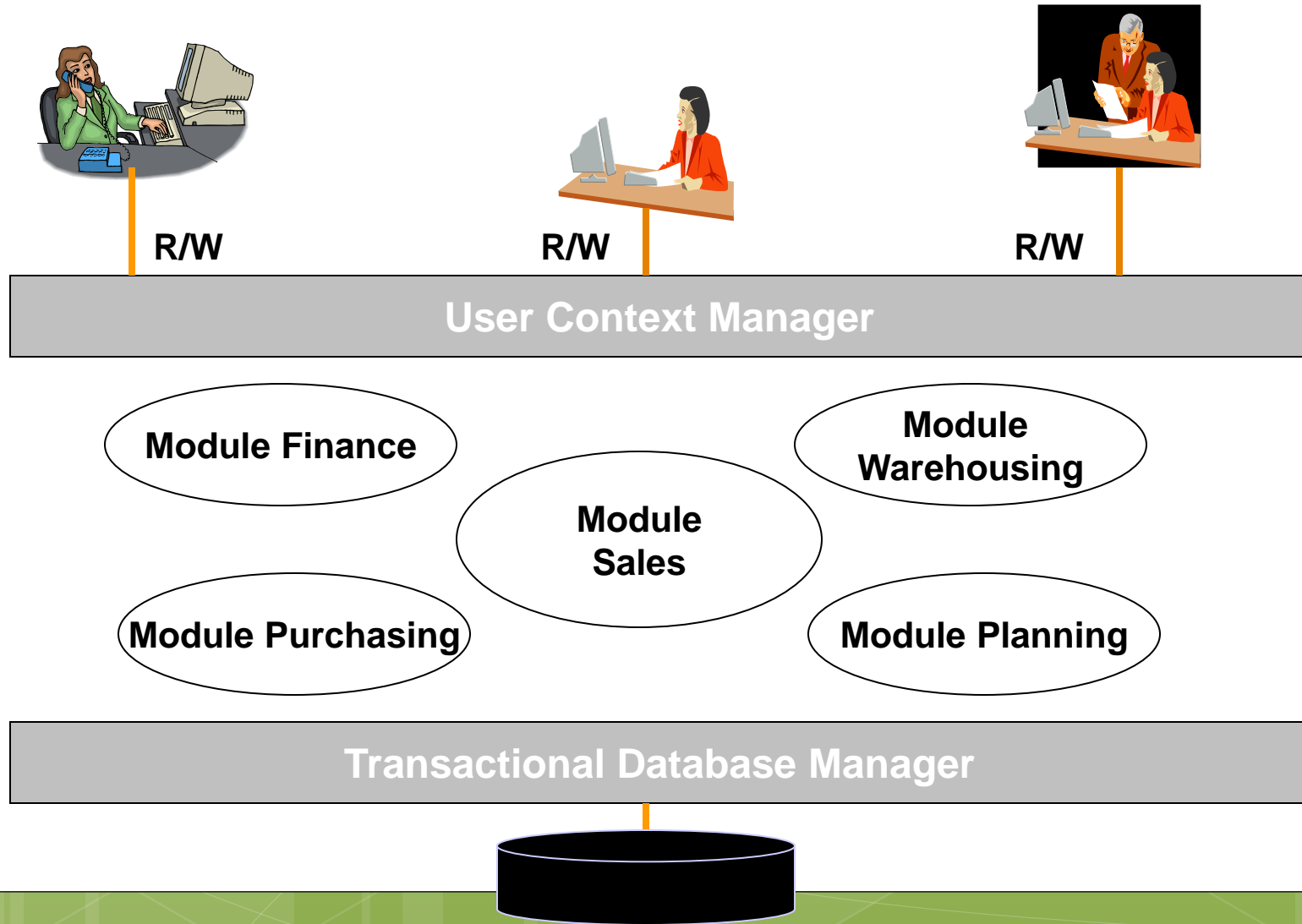
Modul-Modul   User Group   End User

Sales

B/T

Purchase

B/T

Finance

B/T

Planning

Group 1

Group 2

Group 3

User A

User B

User C

An Example of Authorization ERP System 2/2

R/W   **R/W**   **R/W**

User Context Manager

Module Finance

Module Warehousing

Module Sales

Module Purchasing

Module Planning

Transactional Database Manager

An Example Integration of ERP System 1/2

Head Office

INTEGRATION

Branches X

Branches Y

Cost for ERP

Software
(40% - 60%)

***Total Cost of
Overall Implementation***

Added Hardware
(20% - 25%)

**Implementation Services**
(used to cost even more, but not any more)
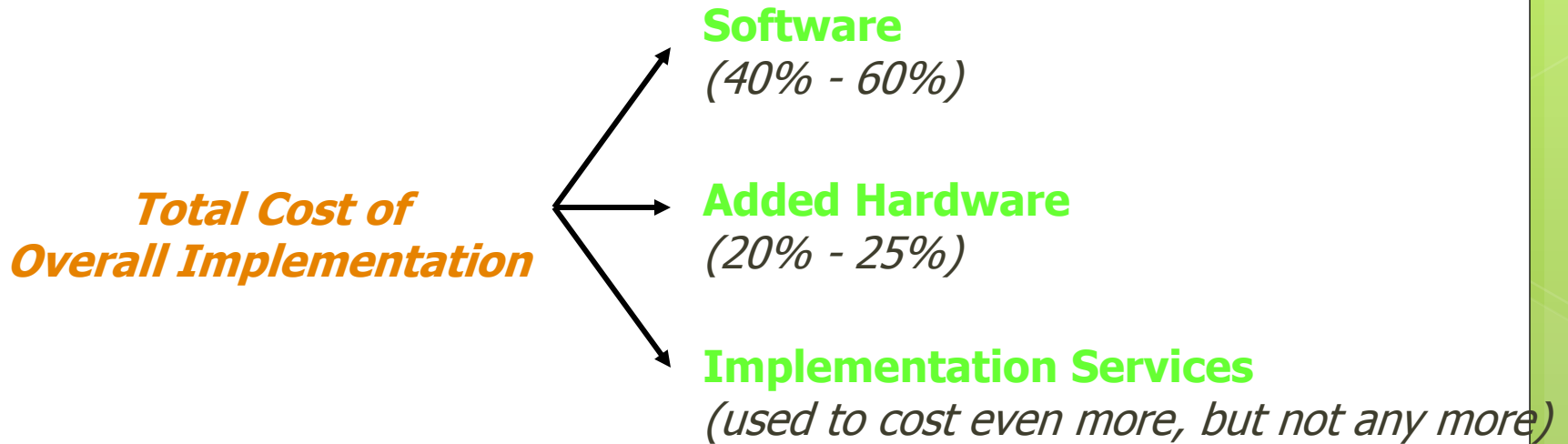
Basically, the cost of ERP implementation varies :
- SME (Small-Medium Size) → US$ 50,000 – US$ 700,000
- Medium Size → US$ 700,000 – US$ 3 Million
- Large Size → More than US$ 3 Million
Most informants, used "annual revenue", NOT number of employees
as a measure for organization size (SME, Medium, Large).

*Because of implementation complexity, one of the vendors interviewed said that
"there is no way can give a price over the phone".*

The ERP Project Structure
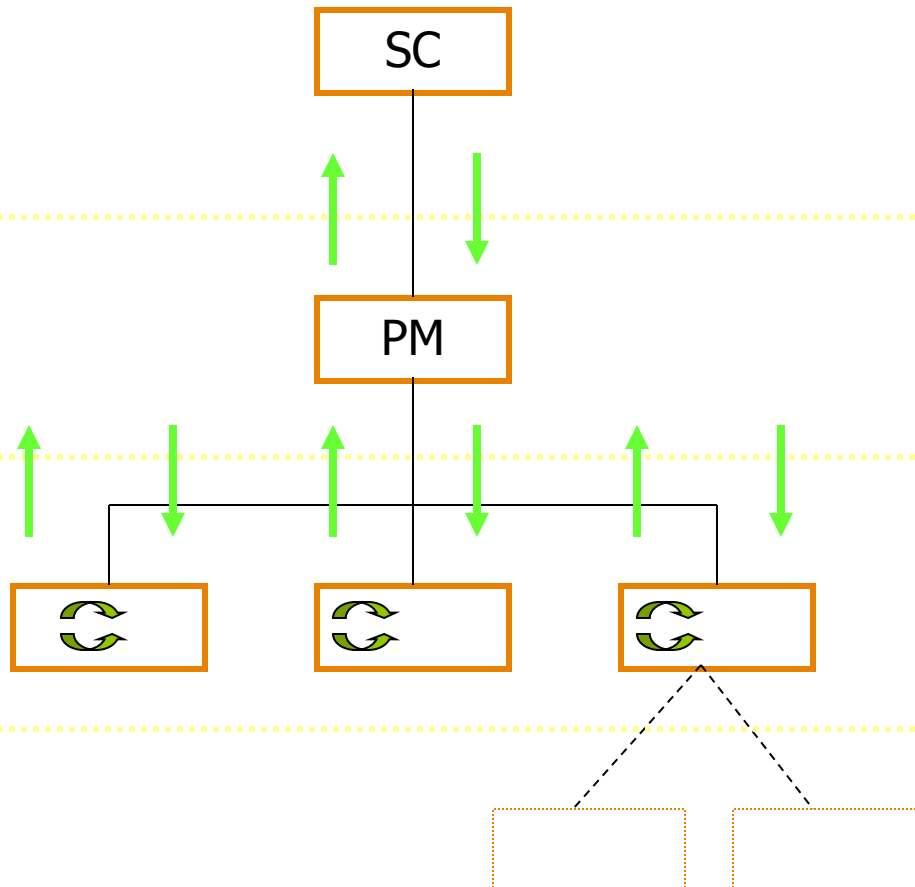
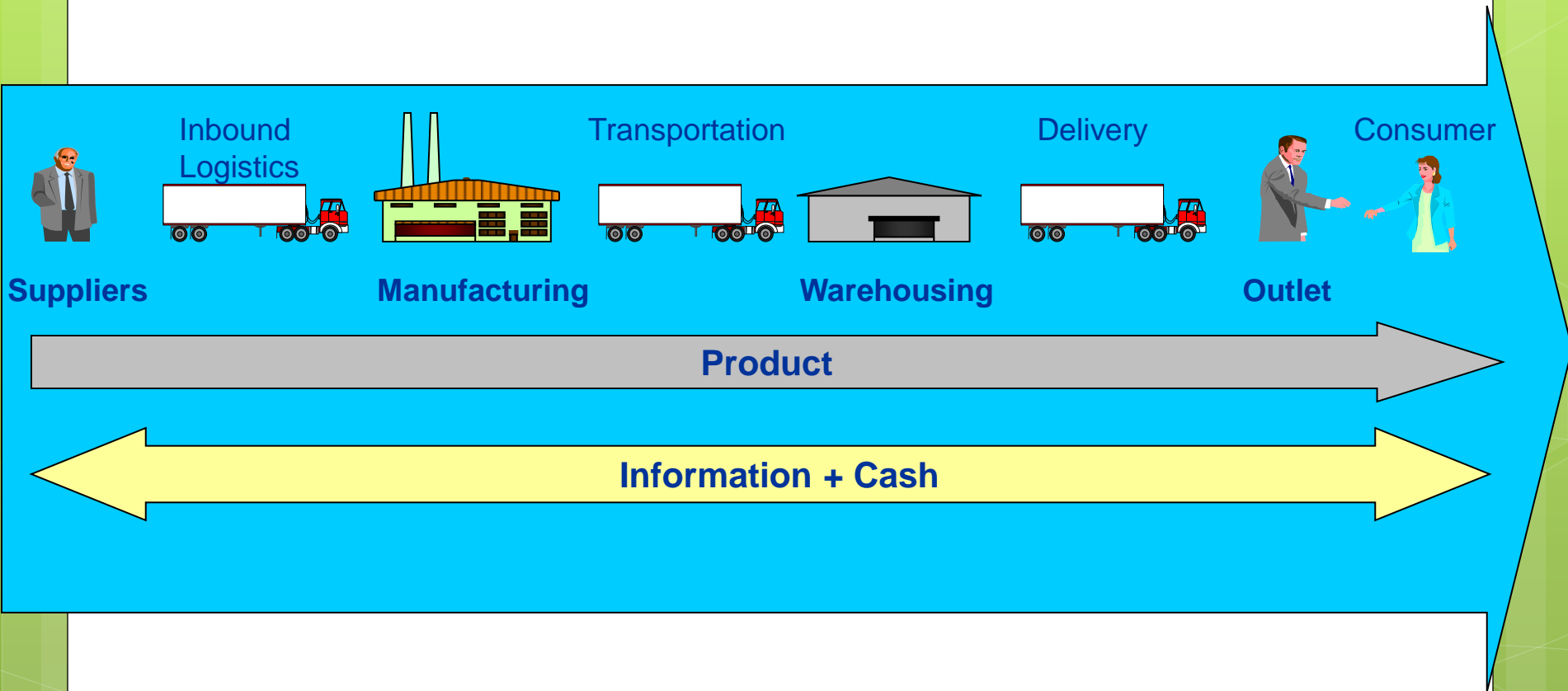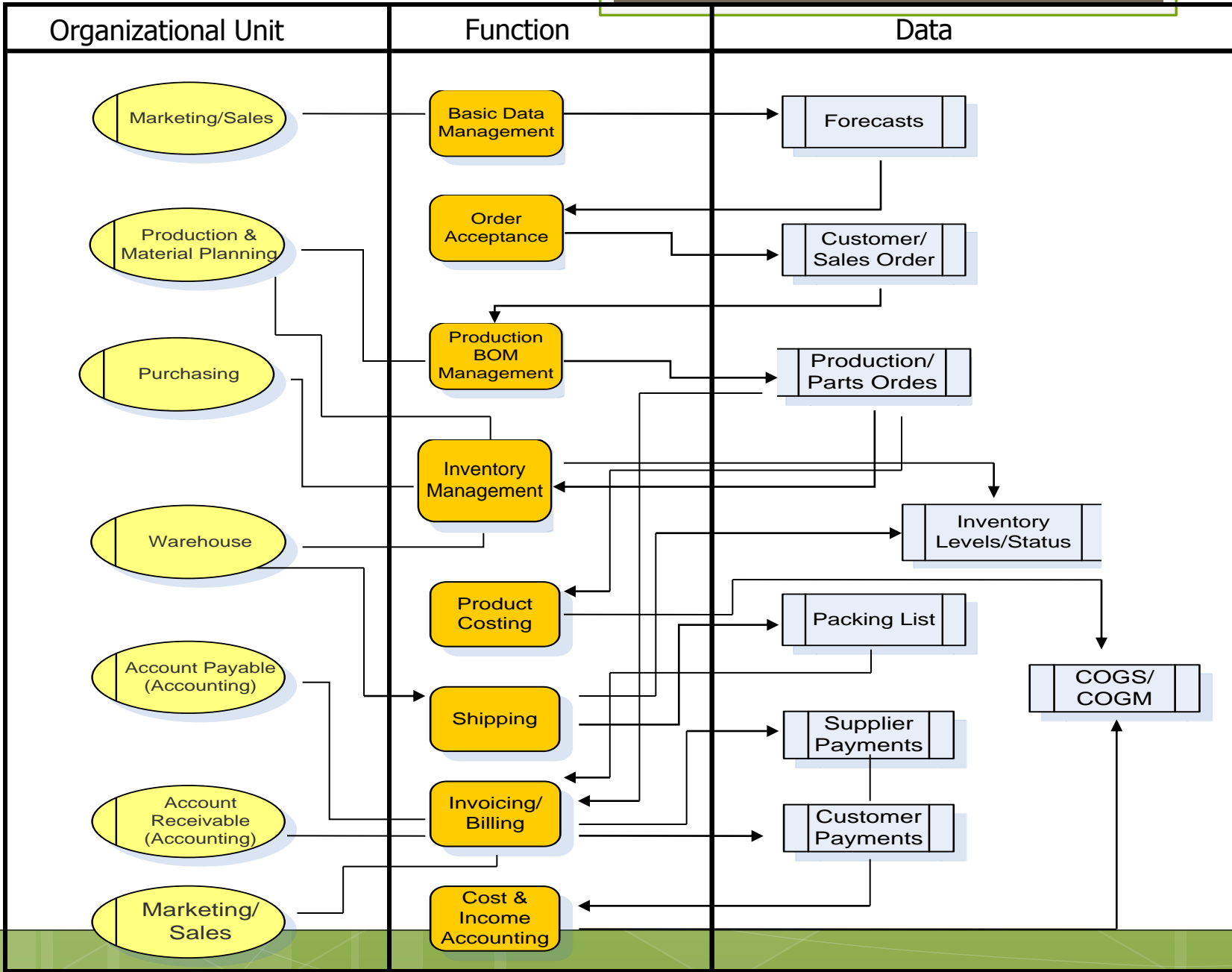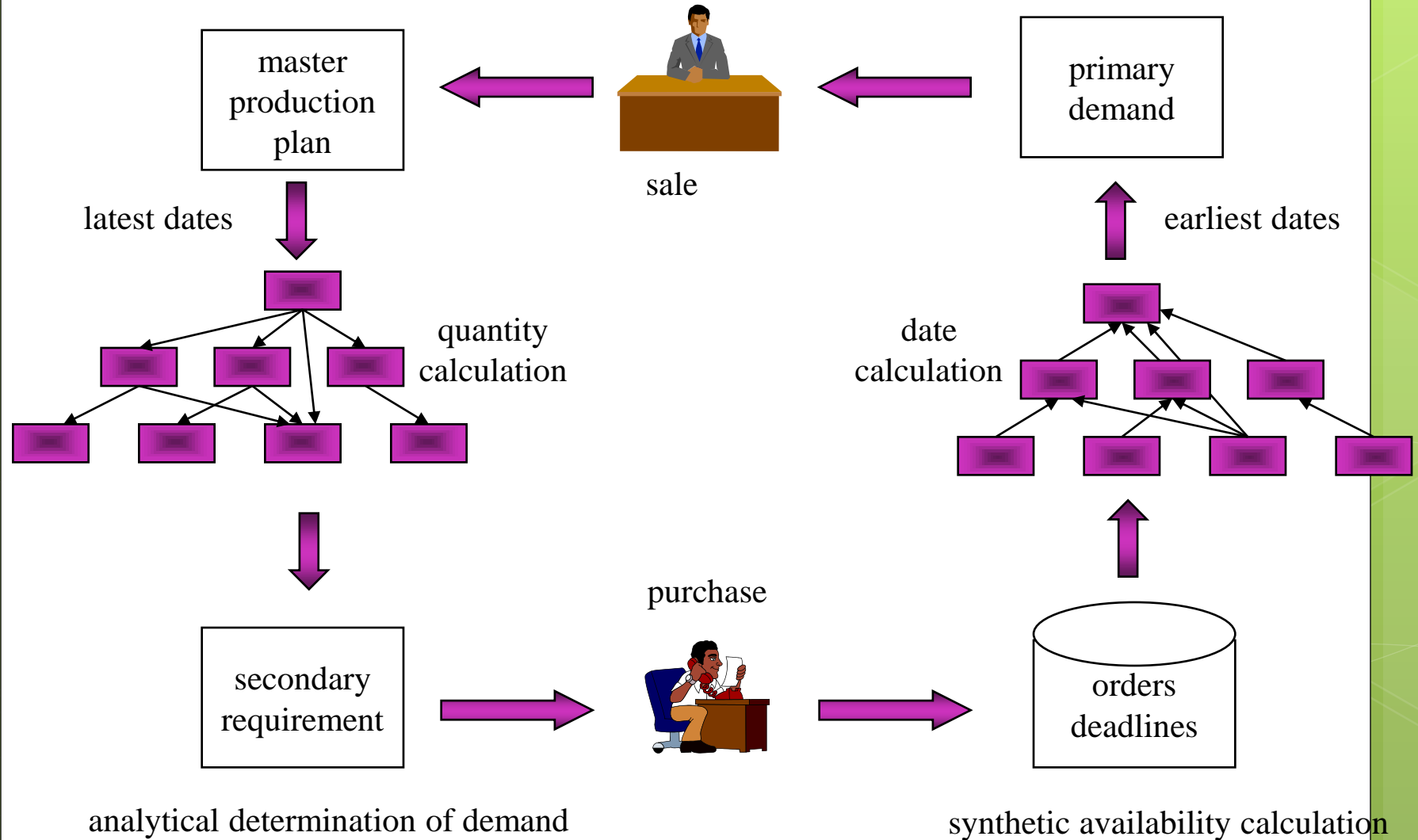|	
SC	- Project sponsor (e.g.: managing director) - Other senior managers - Internal Project Manager (PM) - External PM (e.g.: vendor) **Level 1: Steering Committee (SC)**
PM	- Internal Project Manager (PM) - External PM (e.g.: vendor) **Level 2: Project Manager (PM)**
	- Vendor assigned consultant - Team Leader **Level 3: Implementation teams**
	Level 4: Large projects only

General Business Process Flow
(Manufacturing Based)

Inbound Logistics

Transportation

Delivery

Consumer

Suppliers

Manufacturing

Warehousing

Outlet

Product

Information + Cash

Simply Business Process Chain Diagram for Logistics (Inbound + Outbound)

Organizational Unit	Function	Data
Marketing/Sales	Basic Data Management	Forecasts
Production & Material Planning	Order Acceptance	Customer/ Sales Order
Purchasing	Production BOM Management	Production/ Parts Ordes
	Inventory Management	Inventory Levels/Status
Warehouse	Product Costing	Packing List
Account Payable (Accounting)	Shipping	Supplier Payments
Account Receivable (Accounting)	Invoicing/ Billing	Customer Payments
Marketing/ Sales	Cost & Income Accounting	COGS/ COGM

Cycle of analytic and synthetic determination of demand

master production plan

latest dates

quantity calculation

sale

primary demand

earliest dates

date calculation

secondary requirement

purchase

orders deadlines

analytical determination of demand

synthetic availability calculation
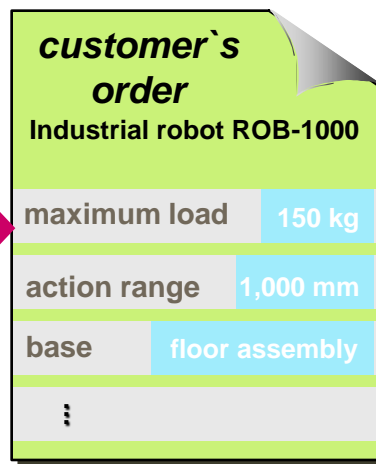
Bill Of Materials (BOM) for customer`s order

customer

standard BOM
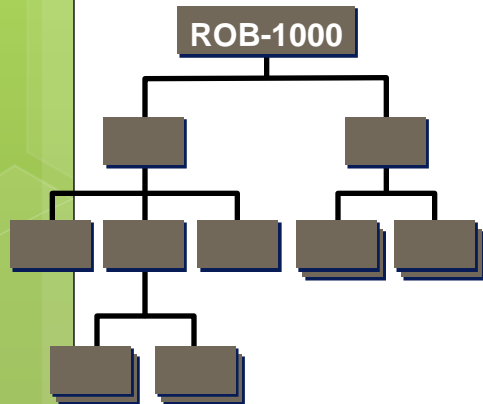
ROB-1000

customer`s order
Industrial robot ROB-1000

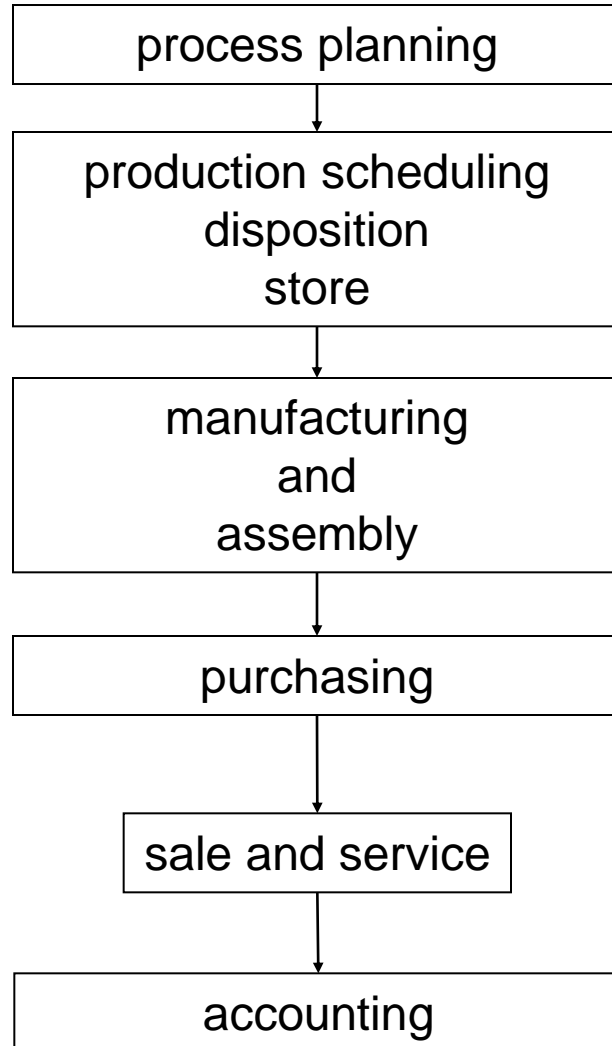|	
maximum load	150 kg
action range	1,000 mm
base	floor assembly
⋮	

interactive configuring and manual changing

customer`s order BOM

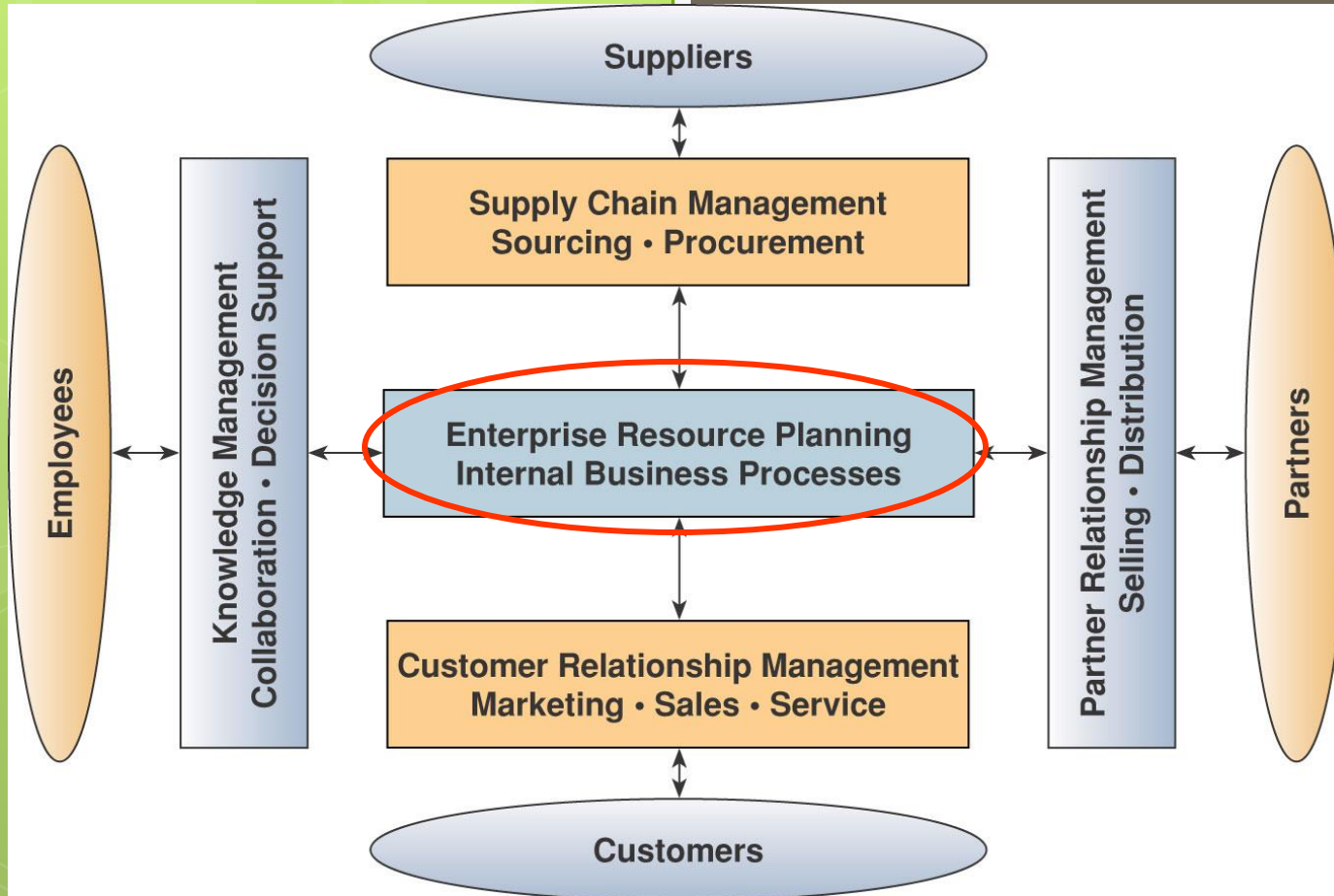ROB-1000
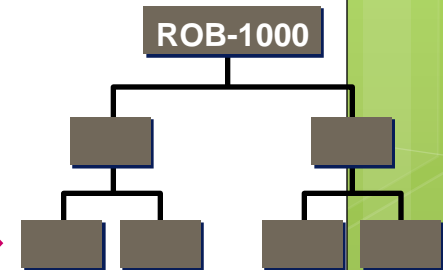
Jobs of Bills Of Materials (BOM)

Functions	Tasks
process planning	• routing • assembly instruction
production scheduling disposition store	• production sequence (assembly sequence) • demand management • allocation of components/materials • availability control
manufacturing and assembly	• reservation • list of product hierarchy (-structure) • summary of required components/assemblies • distribution
purchasing	• purchase of finished parts/raw material • outside supply • pricing
sale and service	• calculation of gross selling prices • lists of substitutes
accounting	• preliminary costing • historic costing • statistics

Source: Hackstein 1989

ERP System Among Others

- **Suppliers**
- **Supply Chain Management**
  Sourcing • Procurement
- **Knowledge Management**
  Collaboration • Decision Support
- **Employees**
- **Enterprise Resource Planning**
  Internal Business Processes
- **Partner Relationship Management**
  Selling • Distribution
- **Partners**
- **Customer Relationship Management**
  Marketing • Sales • Service
- **Customers**

Conclusions 1/2

ERP Implementation allowed:

- An increase in the performance achieved in terms of business process requests served at any given time period

- Better inter-departmental cooperation through the use of the same unified IT – ERP platform by all team members

- A significant decrease in the number of errors in the business process and in the information exchange among business nodes

Conclusions 2/2

ERP Implementation allowed:

- A significant reduction in the workload offered to the central coordinator node

- An increase in the system's fault tolerance in case of business nodes failures

- Easy adaptation of new business methodologies by using standard software engineering procedures

Thank you...

"No product move until information move"

Quotes from **Douglas M. Lambert, 2001.**
*(Professor of Transportation & Logistics and Director of
The Global Supply Chain Forum, Fisher Collage of Business,
The Ohio State University)*