# International Logistics

## Management



- dr Marian Krupa

# AGENDA:

dr Marian Krupa

# 3. IT and International Logistics Management / SCM

**Information FLows**

**MRP /ERP / BPM**

**SAP SCM platform**

**Flexsim / WMS / VMI / RFID**

# Information Flows in Supply Chain and IT

# IT and International Logistics / SCM

## Information flows – introduction:

- ✓ Information about the **flow** (process) is the key (<u>first step</u>) that unlocks all activities in supply chain both <u>pull and push model</u>.

- ✓ To ensure **8R principle** it is necessary to build a complex and visible information system.

- ✓ To balance demand and supply in real time you have to implement IT software solutions (ERP/SCM).

- ✓ All new business model such as: personalization, customization and e-markets are built on the state-of-the-art **IT platforms** – **information technology**.

Mangan, Lalwani, Butcher, Global Logistics and Supply Chain Management, Wiley & Sons, 2008.

# IT and International Logistics / SCM

**Information visibility and transparency:**

✓ **VISIBILITY** <u>– the (technical) ability</u> to see information at various points across the supply chain as and when required.

<u>To have an access to right information at right time</u>.

✓ **TRANSPARENCY** – <u>authorization</u>, the will of all business partners within a supply chain to share information / data.

SC partners must all agree what data are required , when, and whom. They should at least have <u>ability to „talk" to each other</u>.

Mangan, Lalwani, Butcher, Javadpour, Global Logistics and Supply Chain Management, Wiley & Sons, 2012.

# IT and International Logistics / SCM

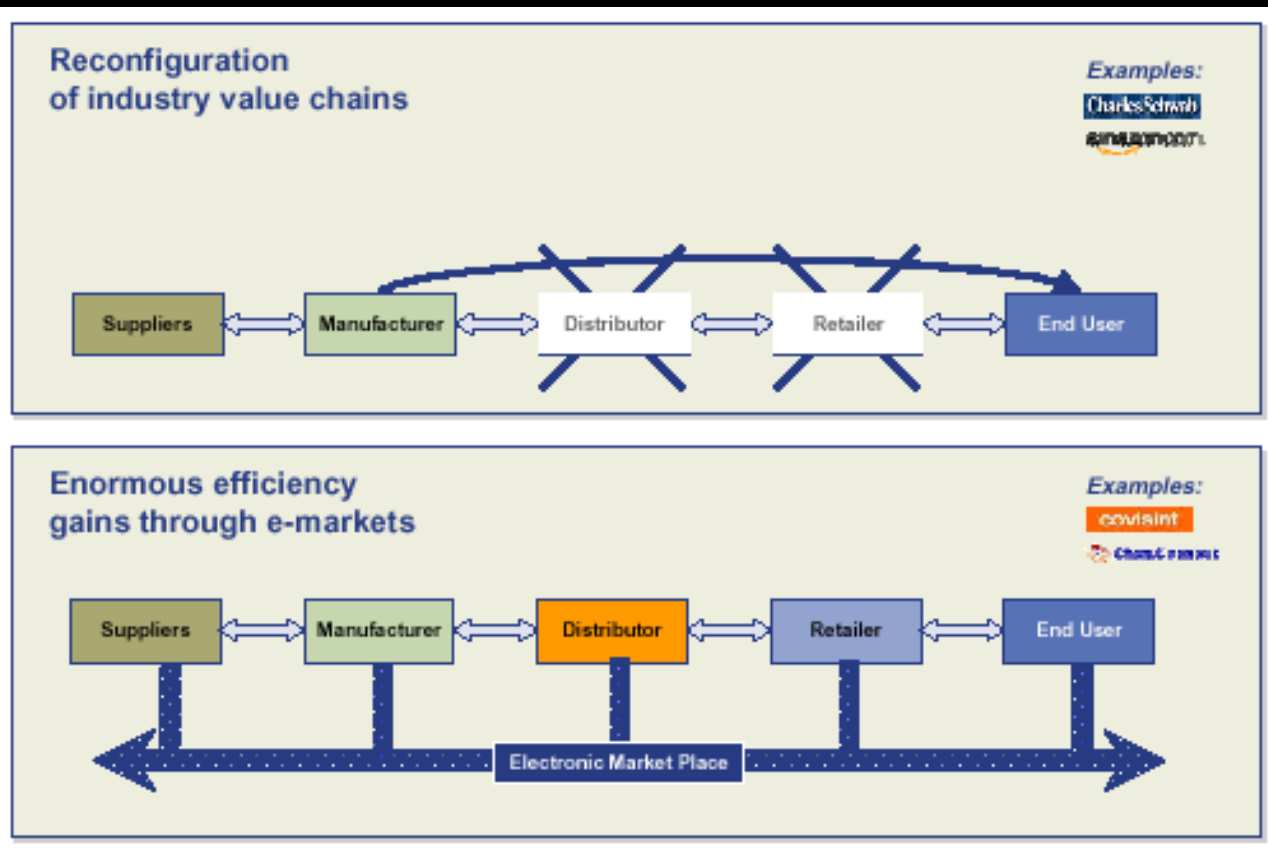**Information visibility and transparency BARRIERS:**

- ✓ **COST** – financial barriers; million of dollars/euros.

- ✓ **COMPLEXITY** – it is very difficult to cover by IT 100% of all key processes and functionalities.

- ✓ **Multi CULTURAL** / axiological global barriers – transparency, trust/loyalty issue.

- ✓ Organizational **CHANGE** obstacles – business does not like change in general.

- ✓ ?

Mangan, Lalwani, Butcher, Javadpour, Global Logistics and Supply Chain Management, Wiley & Sons, 2012.

# IT and International Logistics / SCM

**Information flow MODELS:**
Reconfiguration of industry value supply chain by IT

# IT applications
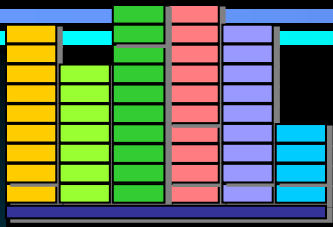# in Logistics and SCM
## IT standards

# MRP /ERP development

BI / HANA

IMIS / DEM

E-BUSINESS

SOA

INTEGRATION

E-comerce

LOGISTICS

MRP / ERP

CRM / SCM / HRS

FINANCE

FI / CO / AM

ES

Expert
Systems

Decision
Support System

EIS

Data
Warehouse

Executive
Information
Systems

TRANSACTION
MODEL

Transaction
Processing
System

DSS

DATA MINING

DW

DECISONs and
ANALYSIS

TPS

| 1950 | 1960 | 1970 | 1980 | 1990 | 2000 |
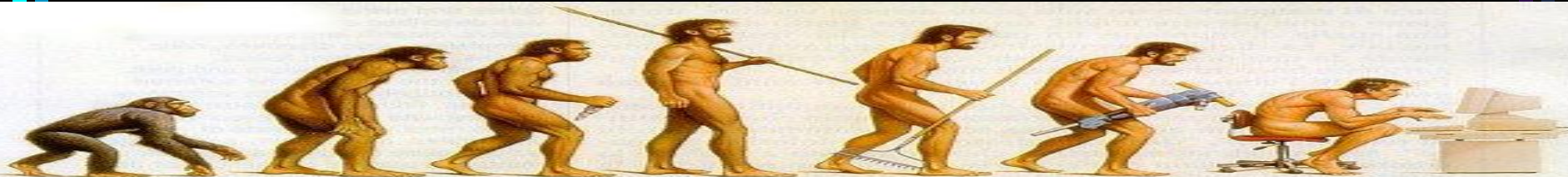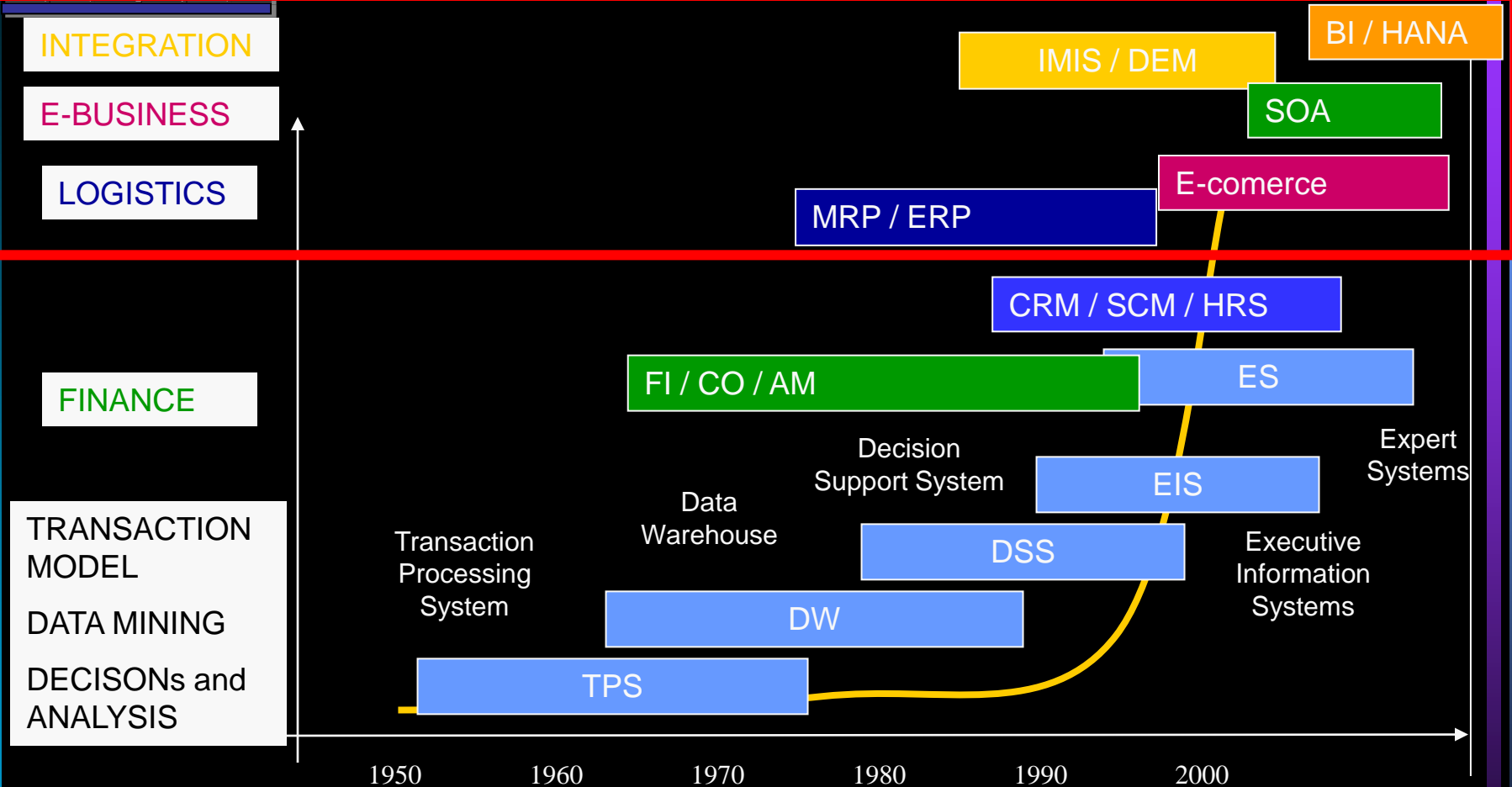
# MRP I
# Material Requirements Planning

# MRP I – definition

**MRP** - <u>Material Requirements Planning</u>

- ✓ Software based production planning and inventory control system used to manage the complexity of procurement process.

- ✓ **Information tool** that plans the types of material needed in the production process.

- ✓ What MATERIAL? What quantity? When? Where? What cost?

# MRP I – purpose

**MRP** – the basic purpose of MRP software is:

To ensure that <u>proper amount</u>

of the <u>right materials</u>

are avaialable for the PRODUCTION process

at the <u>right time</u>.

## JiT principles !

R. Schulteis, M. Sumner, Management Information Systems, Irwin, USA 1989, p. 414.
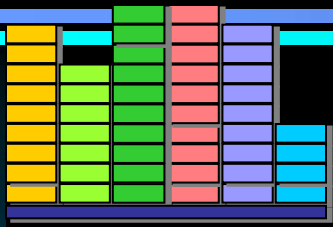
# MRP I - objectives

**MRP** system is intended to meet 3 **objectives**:

1. Ensure materials and products are available for production and delivery to customers.

2. Maintain the lowest possible level of inventory/ costs.

3. Plan 1) manufacturing activities, 2) delivery schedules and 3) purchasing activities.
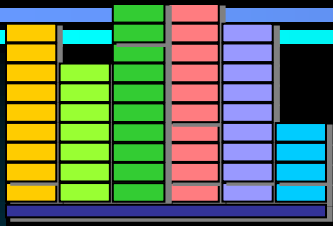
# MRP I - benefits

**MRP** - <u>Material Requirements Planning</u>

- the process of identifying stock that is low (JiT),

- identifying the lead time to get the stock from suppliers (forwarding, shipping management),

- identifying the most cost-effective order quantities,

- and then producing purchase orders for those stock items in the right amount at the right time,

- to ensure the stock will be on hand in the right place.

R. Schulteis, M. Sumner, Management Information Systems, Irwin, USA 1989, p. 414.

# MRP I – how the system works?

**ORDER** → **Master production schedule**

**BOM**

BOM – Bill of Material

**MRP**

**Stock level in the warehouse**

**Material Requirments schedule**
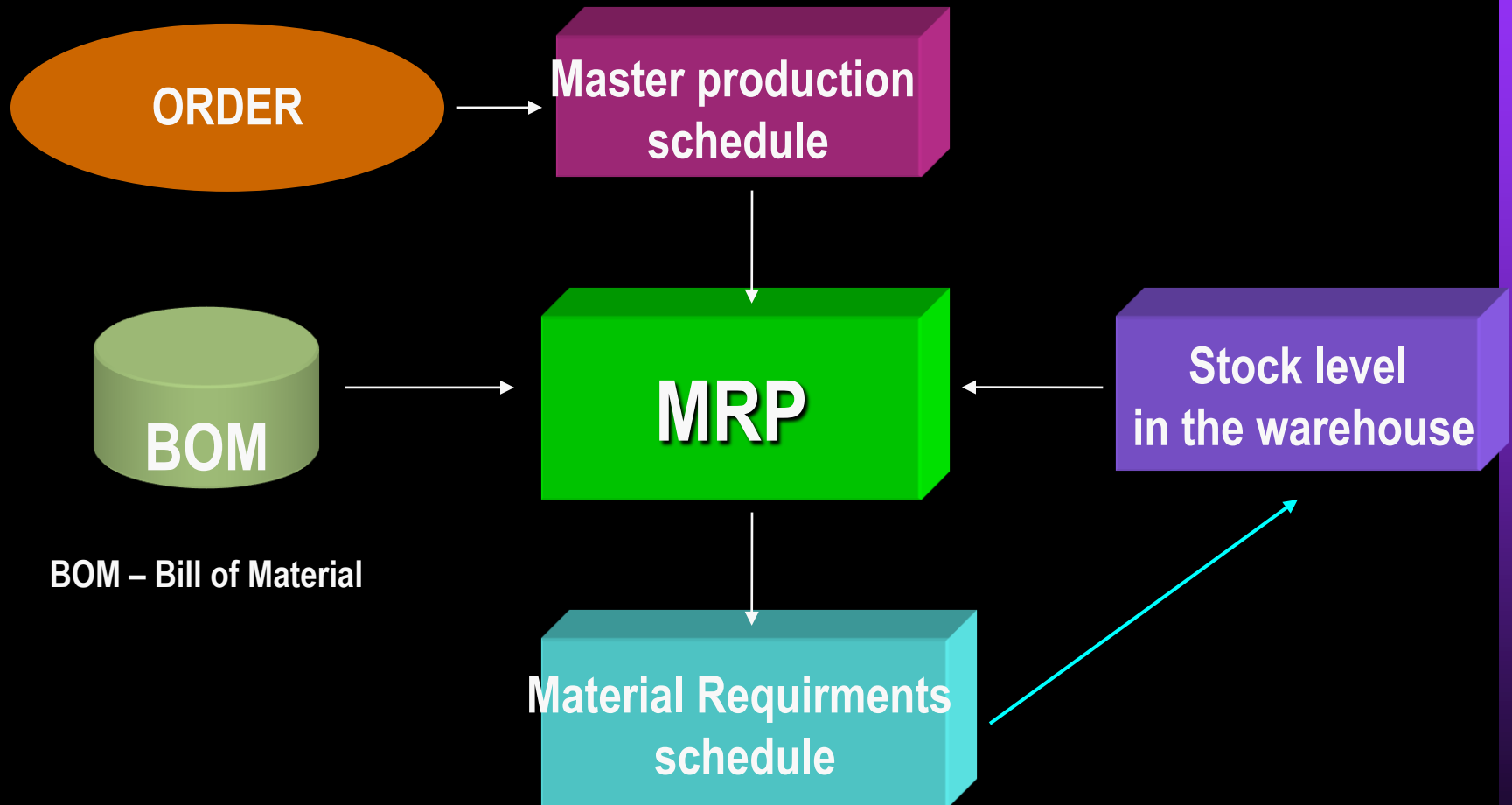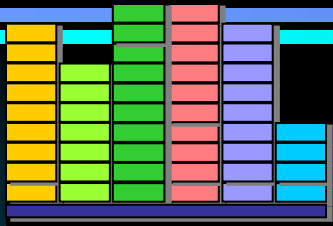
# MRP I - advantages

**MRP** - Material Requirements Planning

- ✓ reduction of the stock level

- ✓ precise time of delivery creation

- ✓ precise production cost evaluation (cost of material)

- ✓ better production capacity implementation

- ✓ faster response to the change in the environment

- ✓ **better production process control** at every stage

from material management point of view.
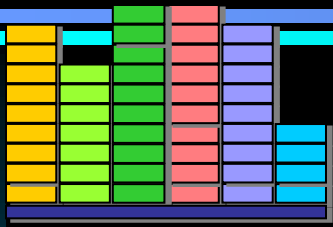
# MRP II

## Manufacturing Resource Planning
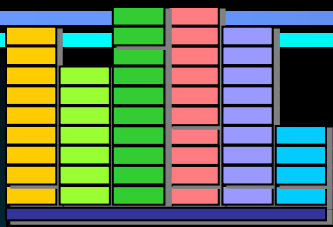
# MRP II - **definition**

**MRP II** (Manufacturing Resource Planning)

- Business software that extends the procurement information system (material requirements planning – MRP I) to production resources planning (PP) and distribution (SD).
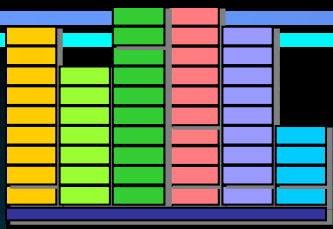
# MRP II – **key features**

**MRP II** refers to the following key features:

- ✓ Project, production orders planning
- ✓ Planning and production control
- ✓ Material Requirements Planning (MRP I)
- ✓ Production capacity planning

# How does the MRP II work?
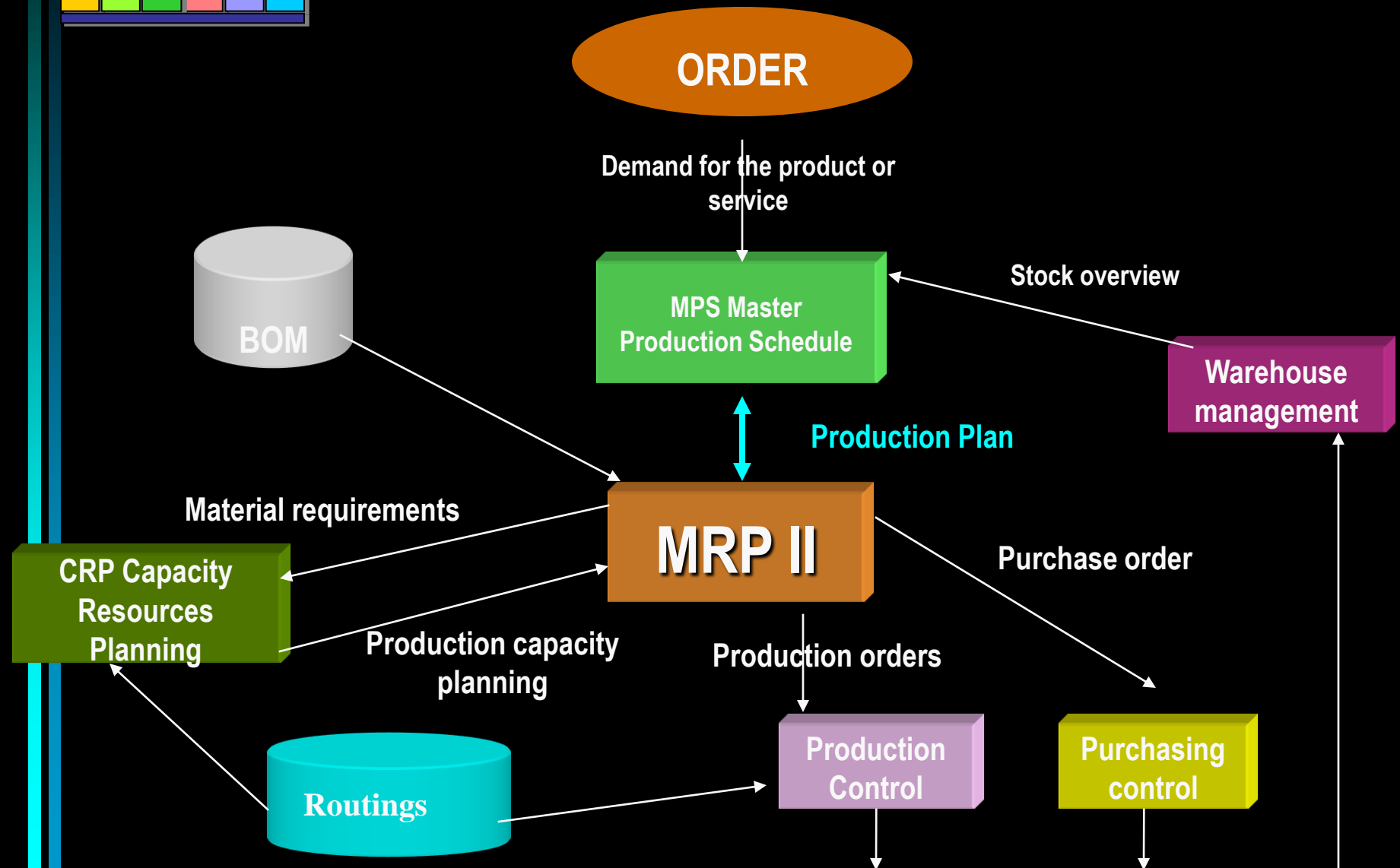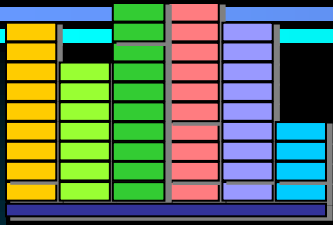
# MRP II – the business model

**Current ORDERS**

**Production PLAN**

**SALES forecast**

**Master Production schedule**

**Materials inventory files**

**BOM**

BOM – Bill of Material

**Engineering design**

**MRP performance**

**Planned-order schedule for suppliers**

**Order releases to production**

**Planned-order Schedule for WM**

R. Schulteis, M. Sumner, Management Information Systems, Irwin, USA 1989, p. 415.
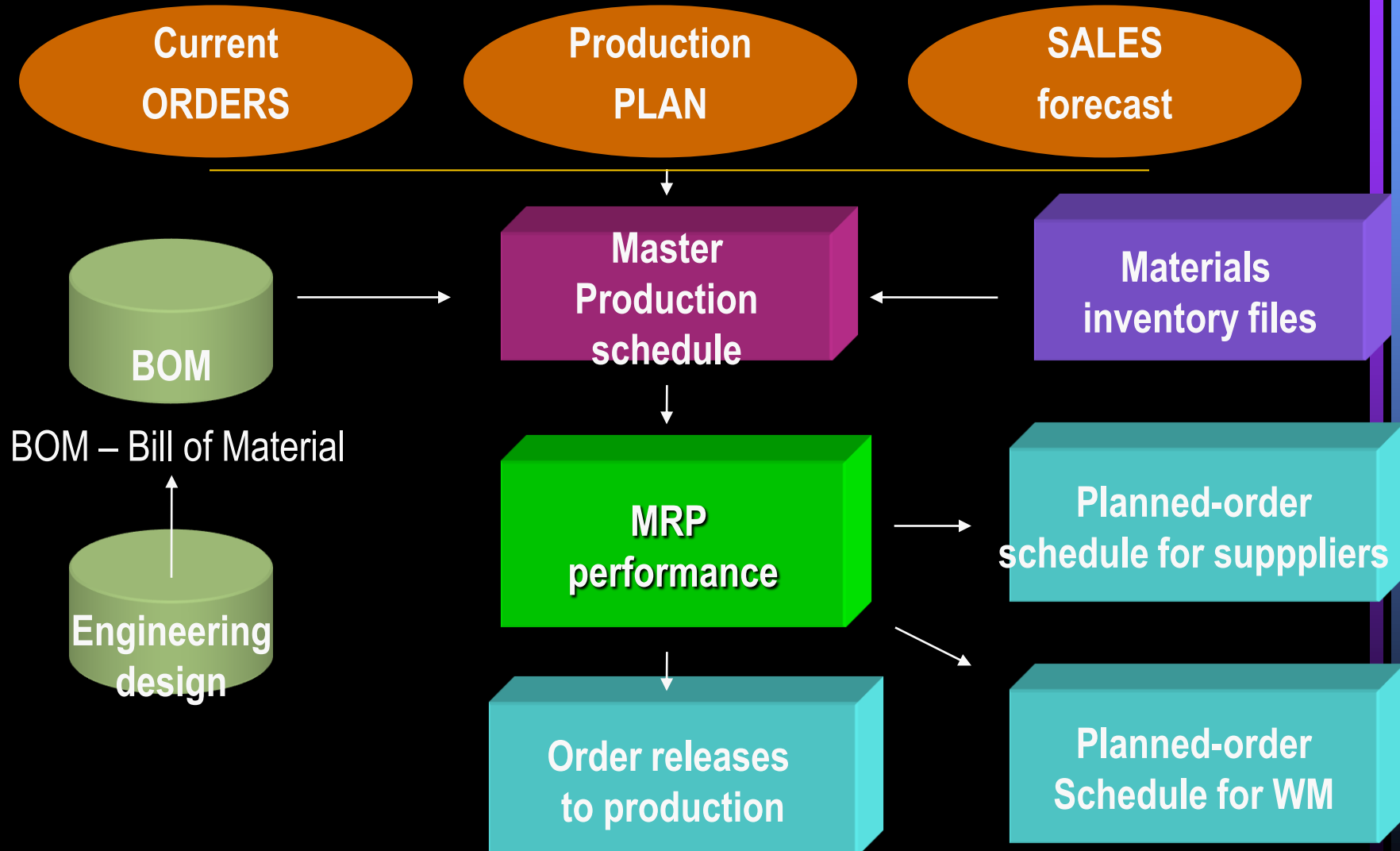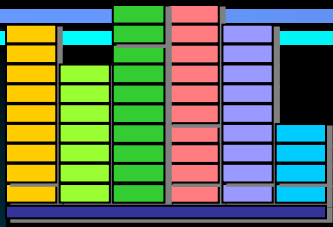
# MRP II – new advantages

**MRP II** - Material Requirements Planning

- ✓ reduction of waste time / material / people

- ✓ precise control of the production time performance

- ✓ precise production cost evaluation

- ✓ better production capacity control

- ✓ faster response to the change in supply / demand

- ✓ better entire production process control at every stage.

# ERP

## Enterprise Resource Planning
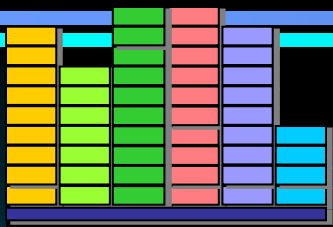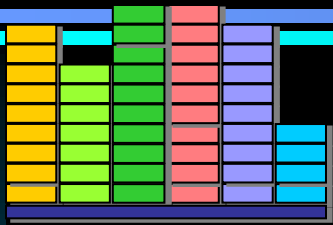
# ERP – **definition (1)**

**ERP** (**E**nterprise **R**esource **P**lanning)

- Software, business management concept and automation information system that integrates multiple (or all) business processes, including planning, manufacturing, logistic, inventory, accounting, human resources, sales, and marketing.

- All and **total (entire) enterprise resource planning** (MK).
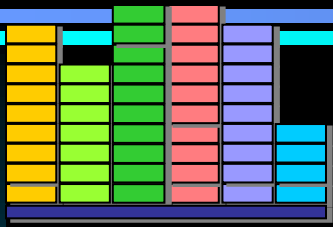
# ERP – **definition (2)**

**ERP** (Enterprise Resource Planning)

- System that integrates (or attempt to integrate) all data and processes of an organization into a single unified, collaborative system within SCM.

- The acronym ERP originated in the **manufacturing (production) environment**.

- Today's use of the term ERP systems has much broader scope – **ERP II**.

# ERP – **definition**

## ERP (I) additionaly consists of:

- CRM - *Customer Relationship Management*,
- SCM - *Supply Chain Management*,
- EDI - *Electronic Document Interchange*,
- Finance – bookeeping, accounting, reporting.

- E-business / mobile - ERPII

# How ERP system works?
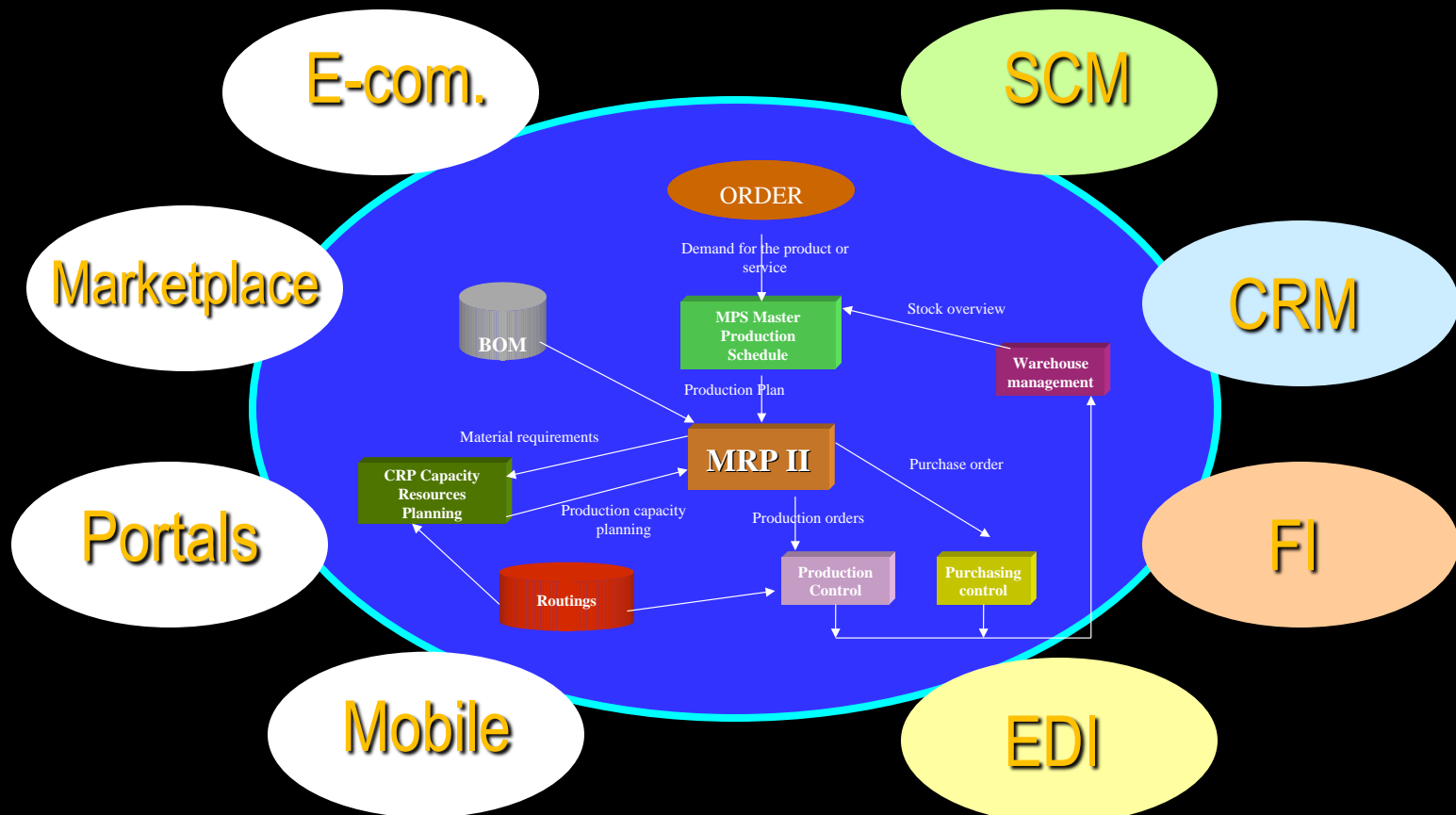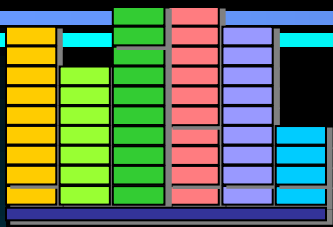
# ERP - **functionalities**

**ERP** – typical implementation would include (1/3):

✓ **Manufacturing:** Engineering, Bills of Material, Scheduling, Capacity, Workflow Management, Quality Control, Cost Management, Manufacturing Process, Manufacturing Projects, Manufacturing Flow

✓ **Supply Chain Management**: Inventory, Order Entry, Purchasing, Product Configurator, Supply Chain Planning, Supplier Scheduling.
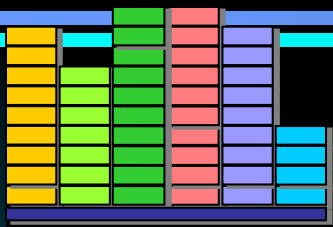
# ERP - **functionalities**

**ERP** – typical implementation would include (2/3):

- **Financials**: General Ledger, Cash Management, Accounts Payable, Accounts Receivable, Fixed Assets

- **Projects**: Costing, Billing, Time and Expense, Activity Management

# ERP - **functionalities**

**ERP** – typical implementation would include (3/3):

- **Human Resources**: Human Resources, Payroll, Training, Time & Attendance, Benefits

- **Customer Relationship Management**: Sales and Marketing, Commissions, Service, Customer Contact and Call Center support

- **Data Warehouse**: and various Self-Service interfaces for Customers, Suppliers, and Employees
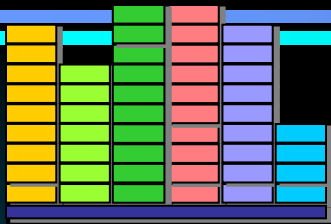
# Mobile technology

| Any Source | Any Role | Any Device |
|---|---|---|
| Web | MD | PDA |
| Business Information Warehouse | CEO | Mobile Workplace |
| Operational System | SVP Sales | PC |
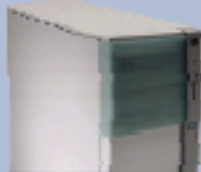
# ERP

case study

# IFS Foundation

| | | Production scheduling | Machinery productivity | | |
|---|---|---|---|---|---|
| Report creator | | Production costs | Machinery monitor | Scheduling | |
| Concern consolidation | | Production performance | Production performance | Preventing repairs | |
| Fixed Assets | Customer orders | CRP Capacity Res.Planning | Employees qualifications | Repairs orders | |
| Accounts Recievable | Invoicing | MRP performance | Payroll rules interface | Equipment providing | |
| Accounts payable | Purchases | Production orders | Time Management | Purchases | |
| General Ledger | Warehouse | Master PLAN | Laboure time controlling | Warehouse | Project designing |
| Accounting rules | Accounting rules | Accounting rules | Accounting rules | Accounting rules | Accounting rules |
| Specification | Specification | Specification | Specification | Specification | Specification |
| IFS Finance | IFS Distribution | IFS Production | IFS Resource Management | IFS Repairs | IFS Designing |

**platforma: IFS FOUNDATION**

# ERP – BAAN IV
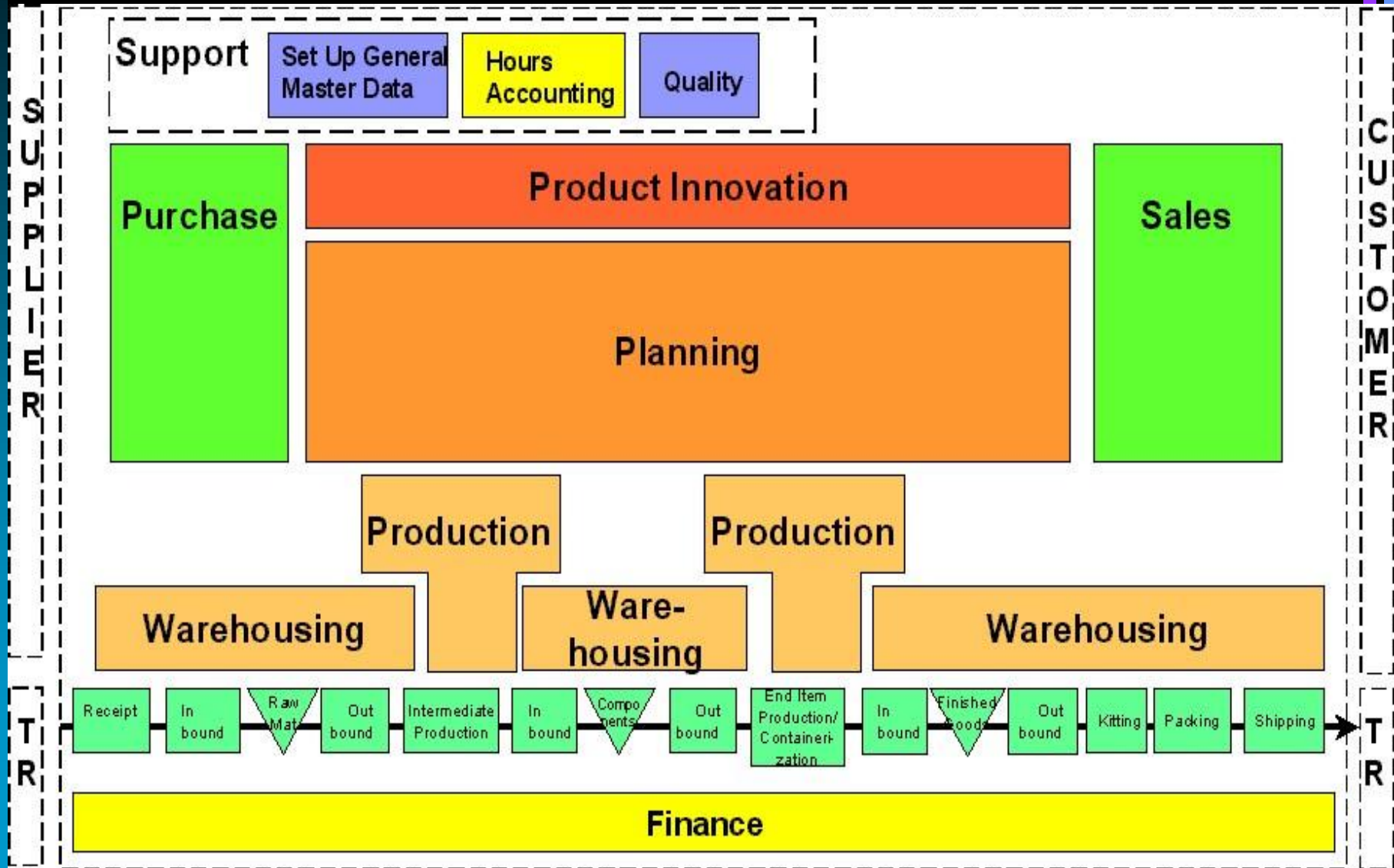
# SAP ERP (R/3) Enterprise – version 4,7

SRM

CRM

SEM

APO

KW

SD

MM

PP

FI

CO

AM

ERP
(R/3)

QM

PM

PS

WF

HR

IS

SAP Web Application Server 6,20

# Oracle

*E-Business Suite*
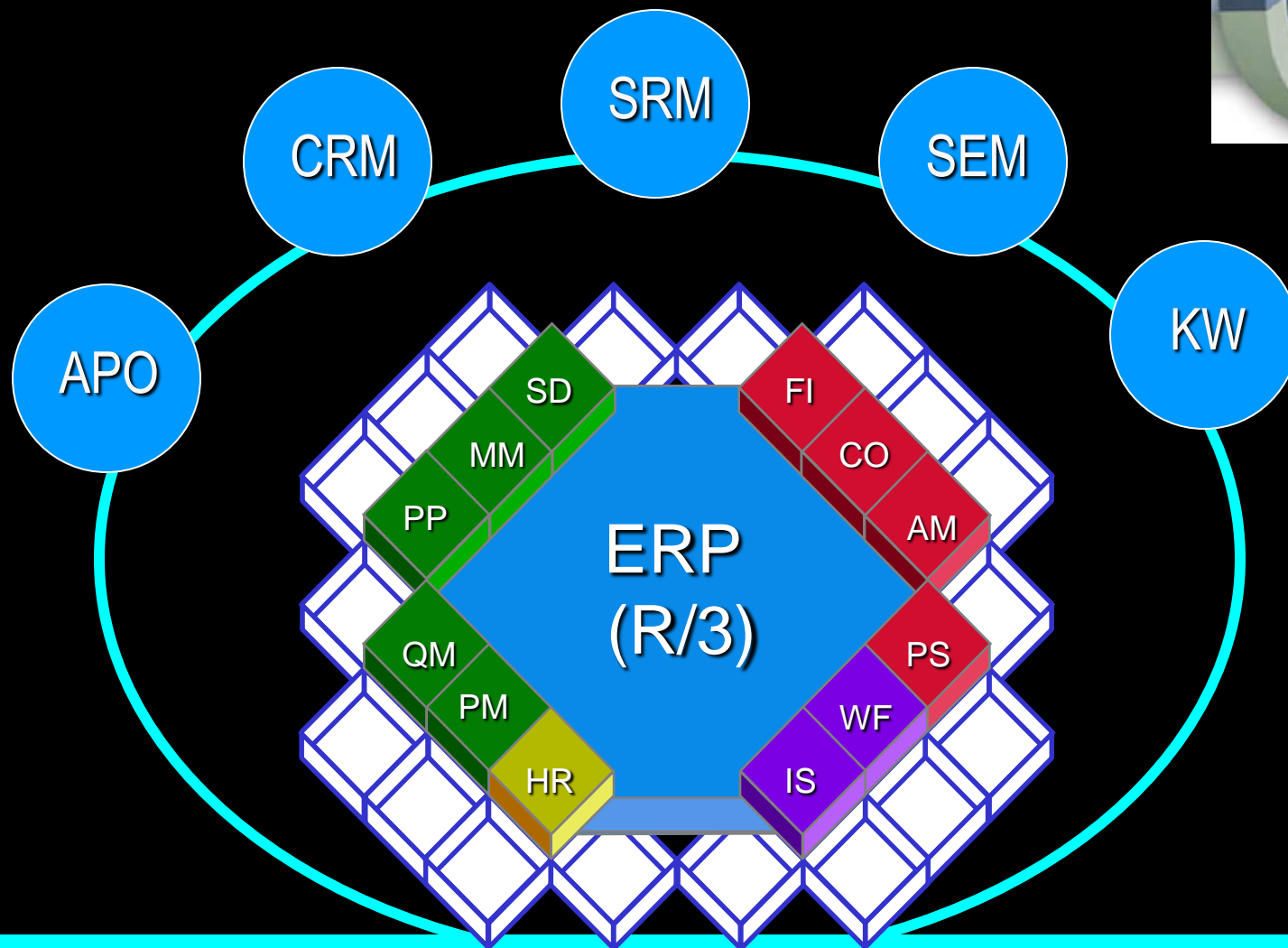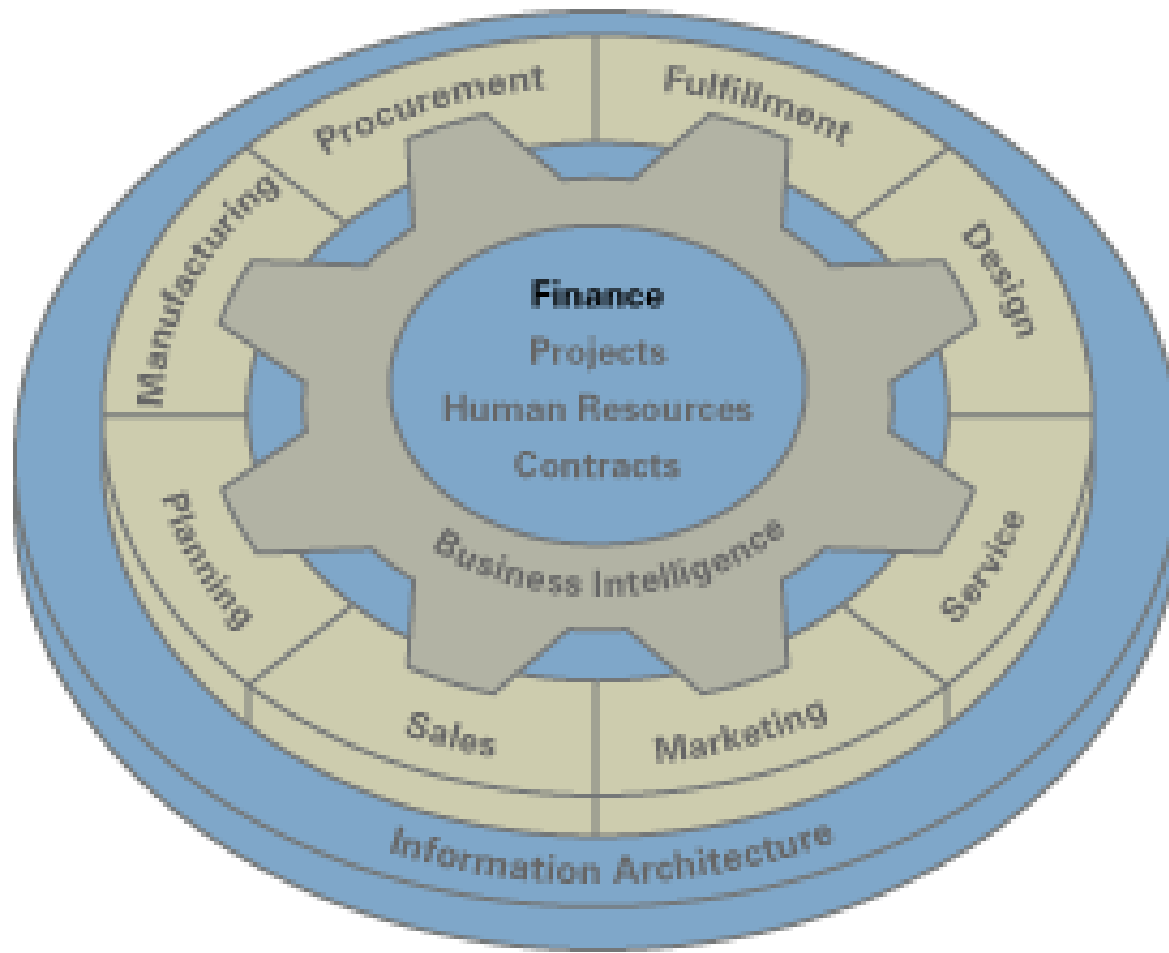


**Financials**

- Assets
- Financial Analyzer
- Financials Intelligence
- General Ledger
- Mobile Financials
- Payables
- Property Manager
- Receivables
- Self-Service Financials
- Treasury

ORACLE
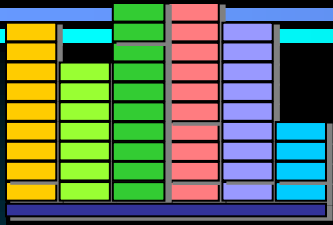
# SAP ERP – collaboration within SCM

# SAP SCM - global

## Worldwide market of ERP software vendors



EXHIBIT 1: 2016 ERP APPLICATIONS MARKET SHARES
SPLIT BY TOP 10 ERP VENDORS AND OTHERS, %

- SAP
- FIS Global
- Oracle
- Fiserv
- Intuit Inc.
- Cerner Corporation
- Microsoft
- Infor
- SS&C Technologies
- Ericsson
- Other
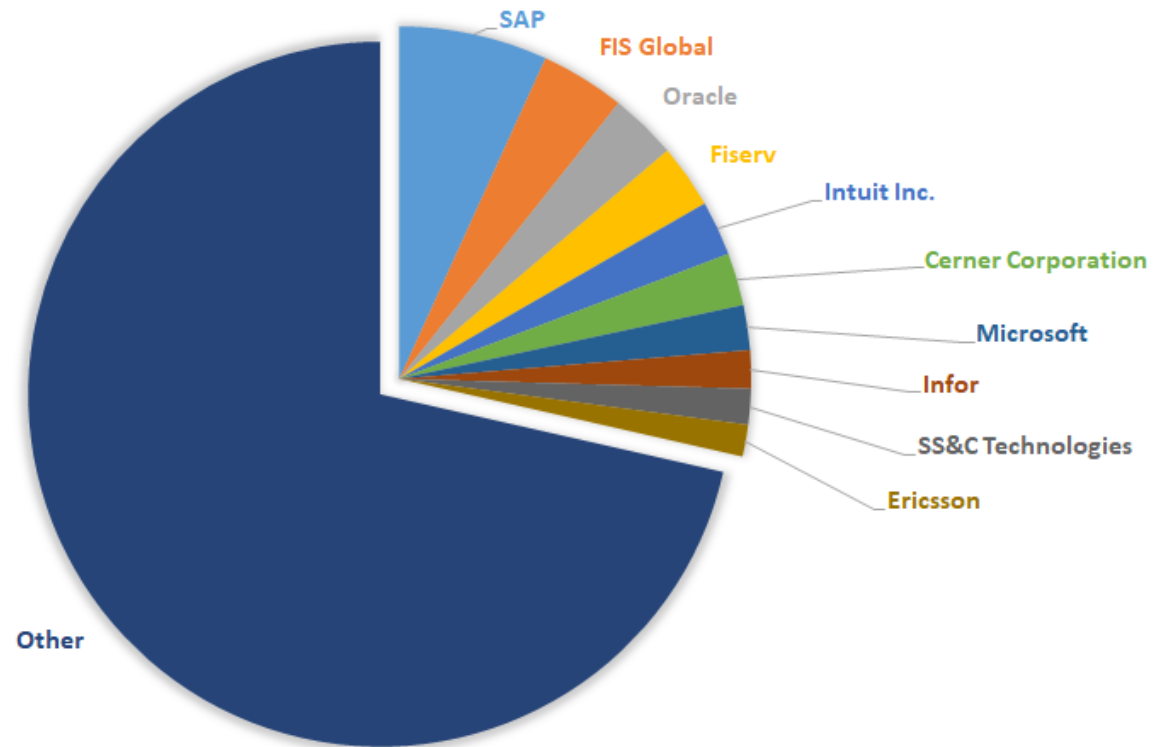
# SAP SCM - global

## Worldwide market of ERP software vendors



Worldwide ERP Software Market Share, 2013
Market Size: $25.4B, 3.8% Growth Over 2012

- SAP 24%
- Oracle 12%
- Sage 6%
- Infor 6%
- Microsoft 5%
- Kronos 3%
- Concur 2%
- IBM 2%
- Totvs 2%
- Yonyou 1%
- Others 37%
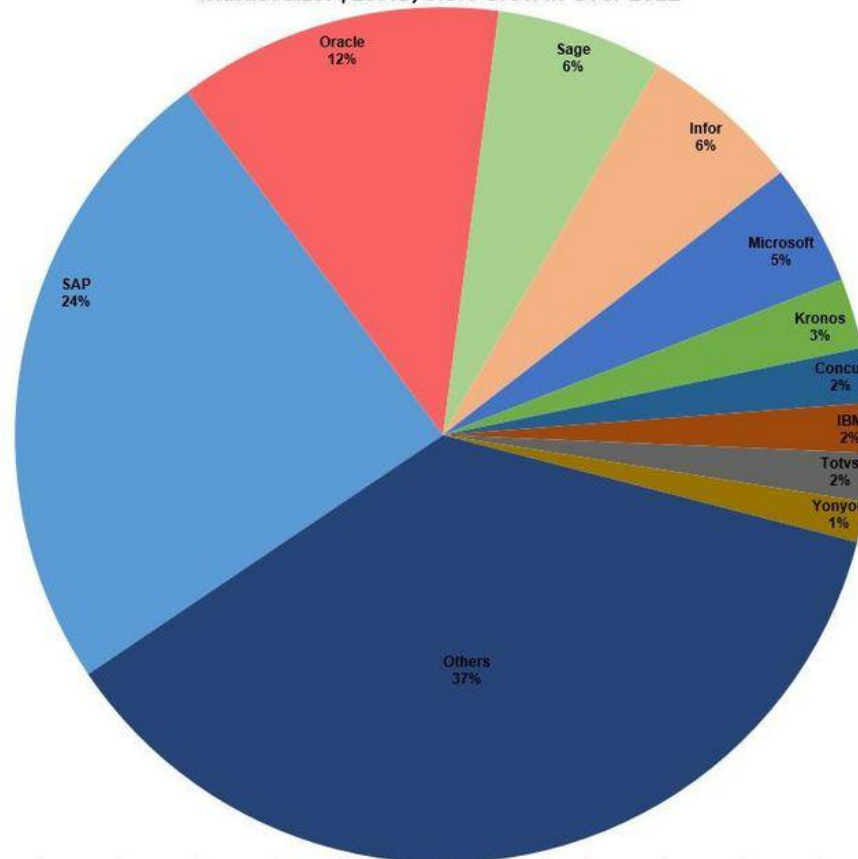
# SALES and Distribution process execution in SAP ERP.

## Logistics and Financial processes integration

*on-line presentation*

# *Integrated business process*

## Sales and Distribution (ERP) and Business Blueprint

- SD
- SD
- WM
- WM
- WM
- SD
- FI
- FI
- BI
- QM

1. Contract creation.

2. Sales order (SO) with reference to the

3. Warehouse order creation with refere

4. Material movement / picking-up the st

5. Posting the material movement.

6. Invoice posting and publishing.

7. Receivables analysis.

8. Payment posting.

9. The contract status analysis.

10. Quality evaluation of the process.



Proces Obsługa zlecenia sprzedaży
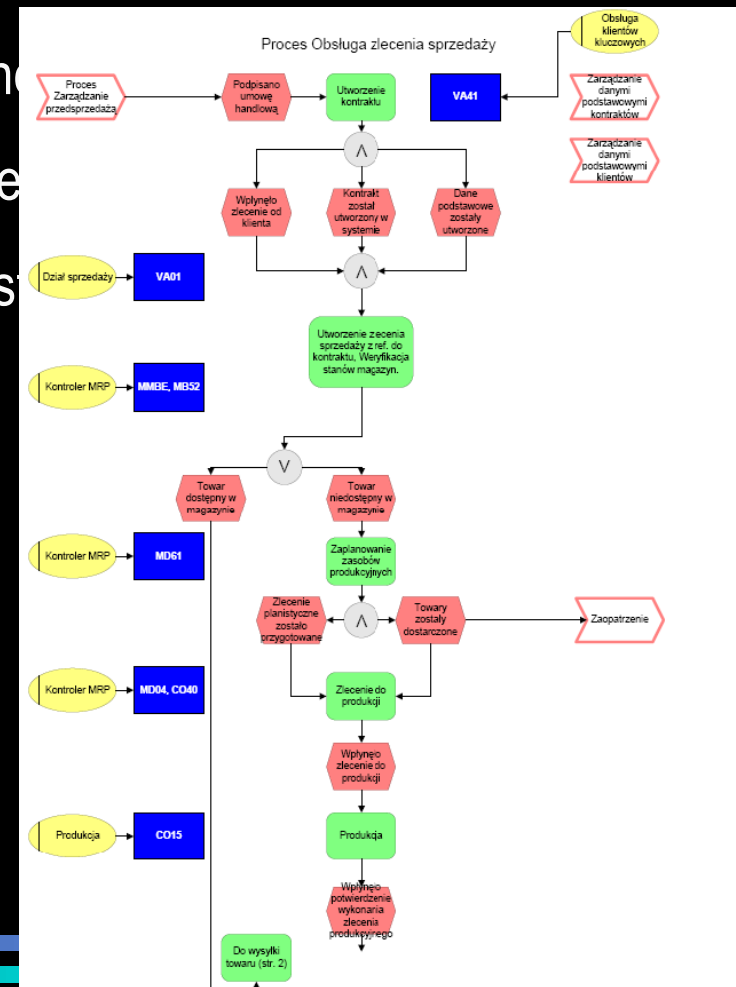
# STRATEGIC MANAGEMENT (SEM) / BPM

## Business blueprint

**Sales Order** → Contract creation → Sales order creation → Outbound delivery → Invoice creation → Accounts receivable mgmt. → Incoming payments → Status contract control
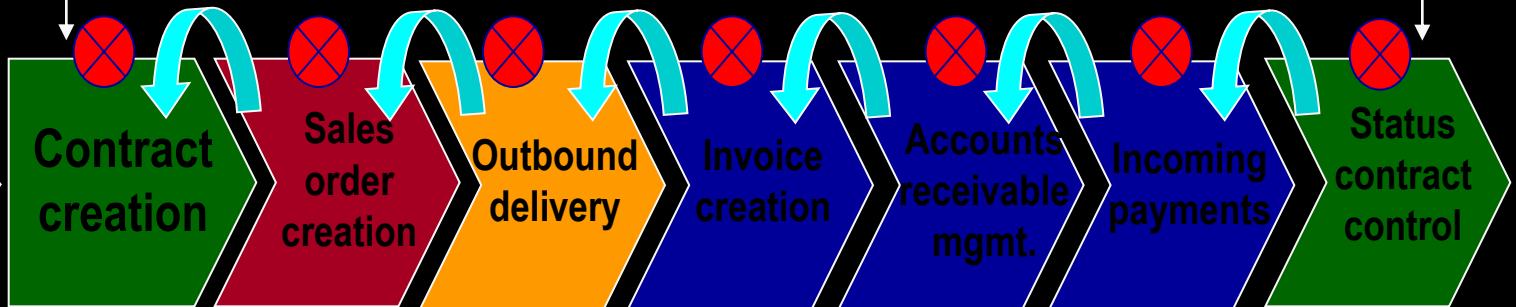
**SAP ERP**

| VA41 | VA01 | VL01N | VF01 | FBL5N | F-28 | VA43 |

Material, Customer, GL Accounts, Cost centers etc.

Document type, Logistics structure, GL, Standard org. structures

## ABAP (java)

# Sales and Distribution (ERP)

- **EPC / BPM**
- **SAP ERP**
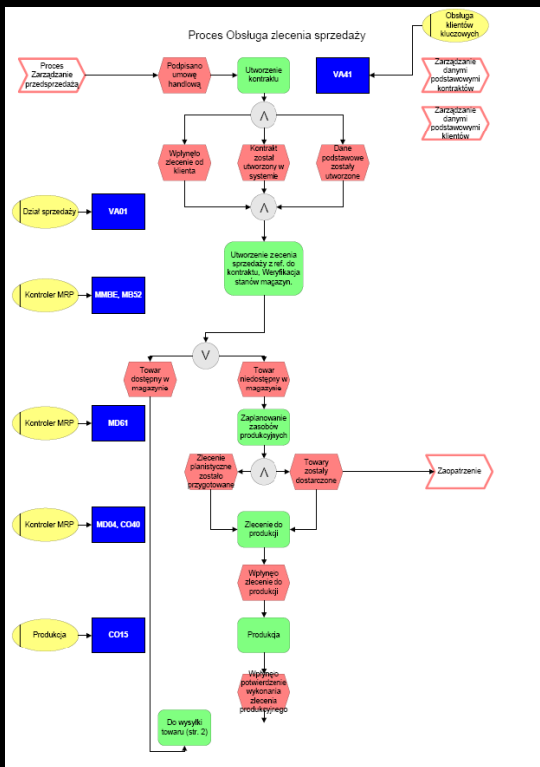
# Sales and Distribution ( SAP ERP)
# - Execution process - all transactions



PR01-SD__SALES / Proces sprzedaży z referencją do KONTRAKTU

- VA41 - Contract creation / Tworzenie kontraktu
- VA43 - Contract Status Display / Wyświetlanie kontraktu
- VA01 - Sales Order creation / Tworzenie zlecenia klienta
- VL01N - Outbound Delivery/WM Creation / Tworzenie dostawy wych. do
- LT03 - Wareouse Transfer Order Creation / Tworzenie zlec. przen. dla do
- VL02N - POSTING - WM / KSIĘGOWANIE - Zmiana dostawy wychodzącej
- VA43 - Contract Status Display / Wyświetlanie kontraktu
- MB03 - Display Material Document / Wyświetlanie dokumentu materiałowe
- FB03 - Display FI Document / Wyświetlanie dokumentu księgowego
- VF01 - Create Invoice Document / Tworzenie faktury - ZAPIS
- VF02 - POST and Print Invoice / KSIĘGOWANIE /DRUKOWANIE / Zmiana
- VA43 - Contract Status Display
- FB03 - Display FI Document
- FBL5N - Receivables Analysis / Analiza należności
- F-28 - Incoming PAYMENTS / Księgowanie wpływu płatności
- FB03 - Display FI Document
- VA43 - Contract Status Display
- FBL5N - FINAL Receivable report

# Sales and Distribution ( SAP ERP)
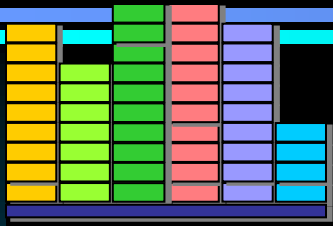## - SD Reporting – towards Business Intelligence

# Business Process Management (BPM)

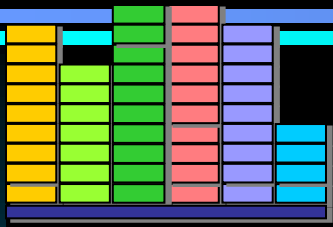# ERP project starts with…

## Process Mapping and Modelling

# Business Process Mgmt.

**BPM** – a concept (tool) for managing the complexity of business processes within one or within the network of different organizations:

- Actively supports, by controlling complexity, all group interests within the network (e.i. supply chain);

- It is a central repository of all business processes (**best practices**);

- Better understanding of flows within the network.

- Global level via access to all shared resources.

# Business Process Mgmt.

**BPM** – key issues and terms:

- **Process design and mapping** – all key business processes inventory (AS-IS).

- **Process business simulator** – data collection and different variants analysis and evaluation based on an existing business model (TO-BE).

- **Process development and optimization** – implementing entirely new concepts - business models (DESIGN).

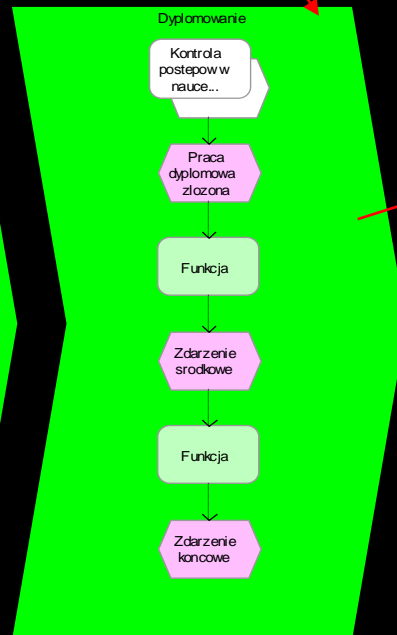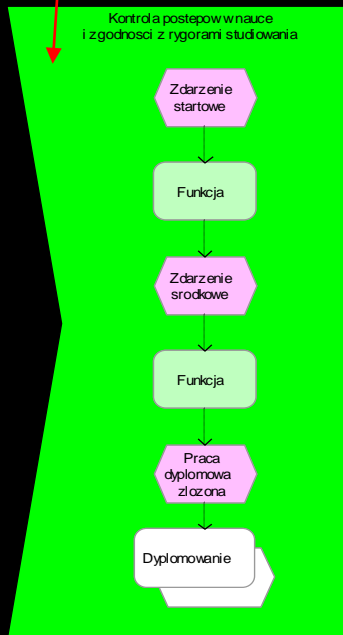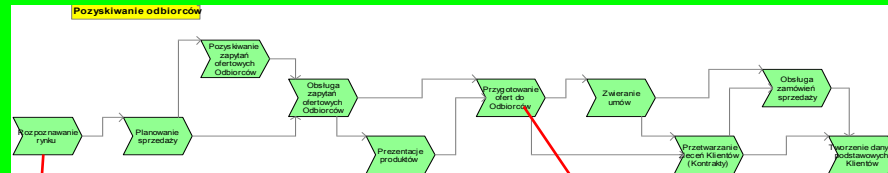- **Process automatic control** - a planned sequence of operations within a given process (WORKFLOW).

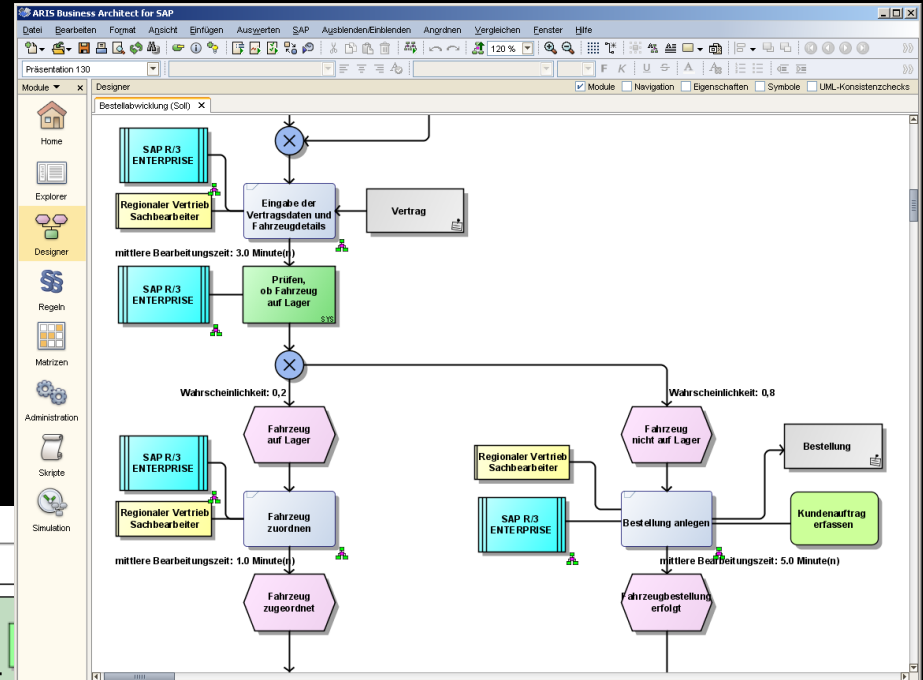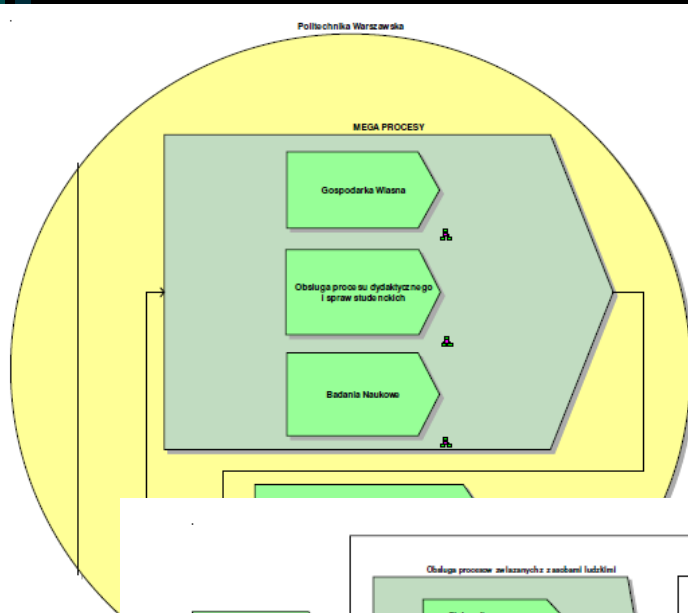# Process Modelilng / „Ad hoc" diagrams
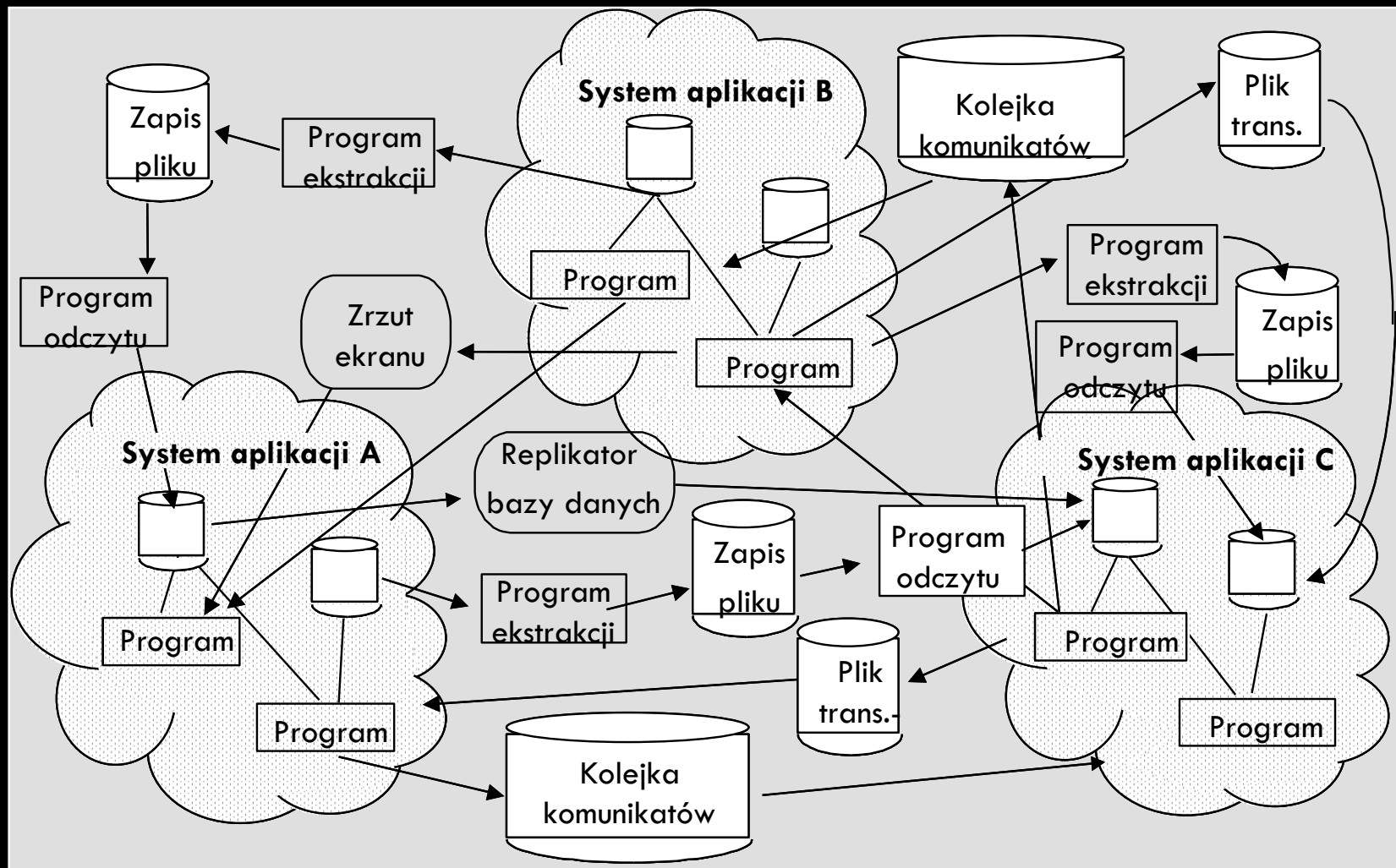
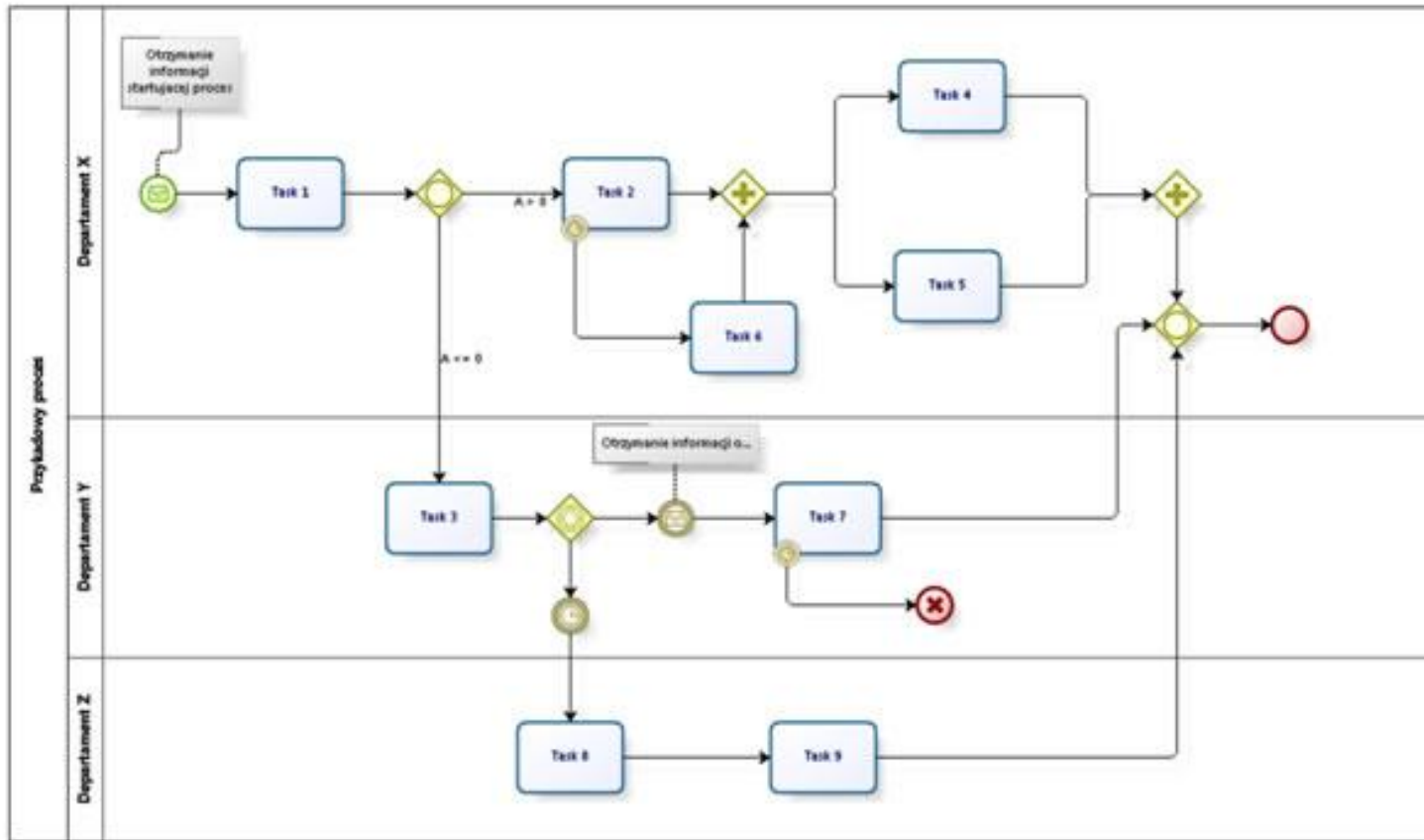# Process Modelilng / Block diagrams / Flow Charts
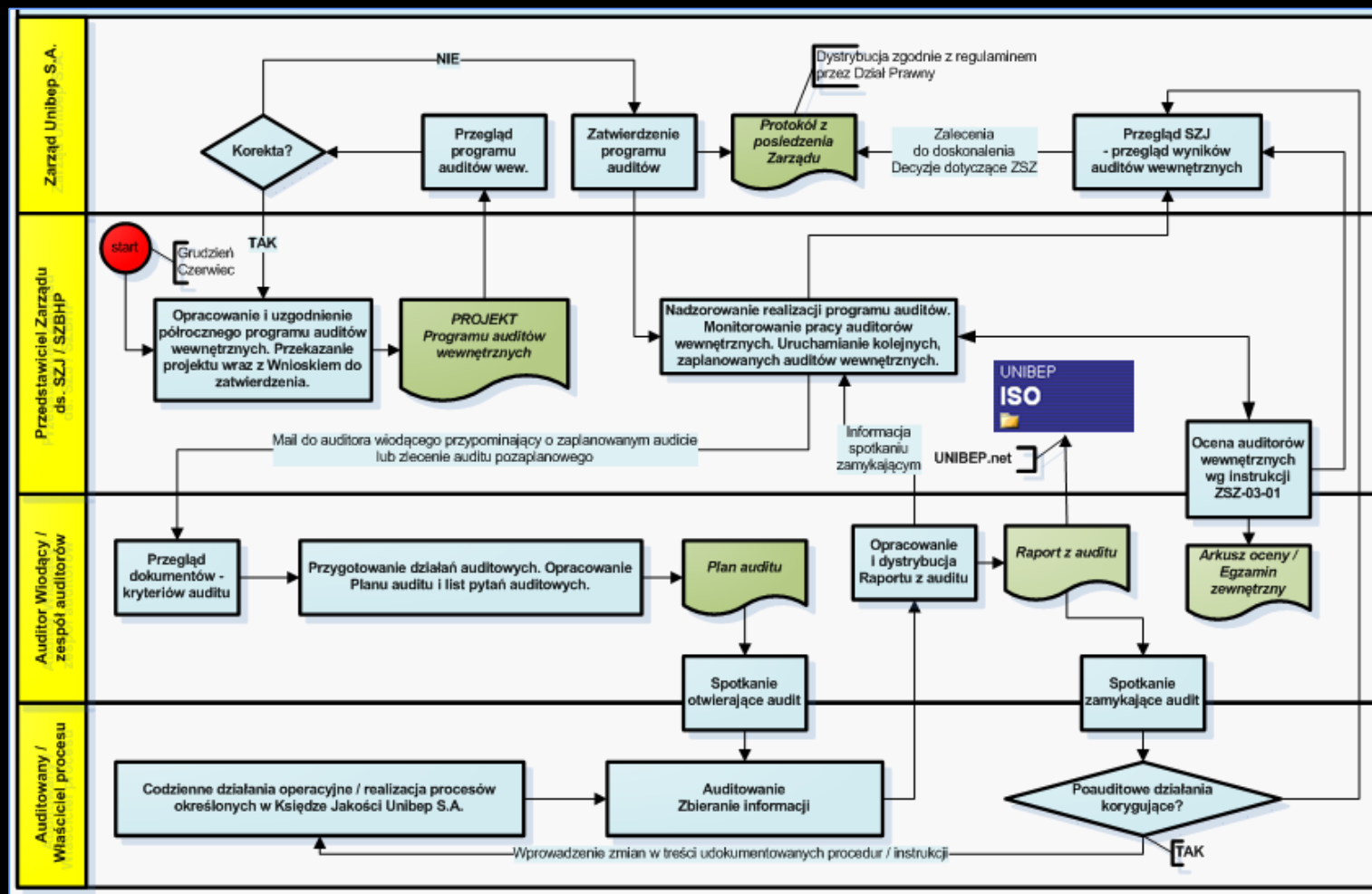
# Process Modelling and Mapping / EPC (Event-driven Process Chain)
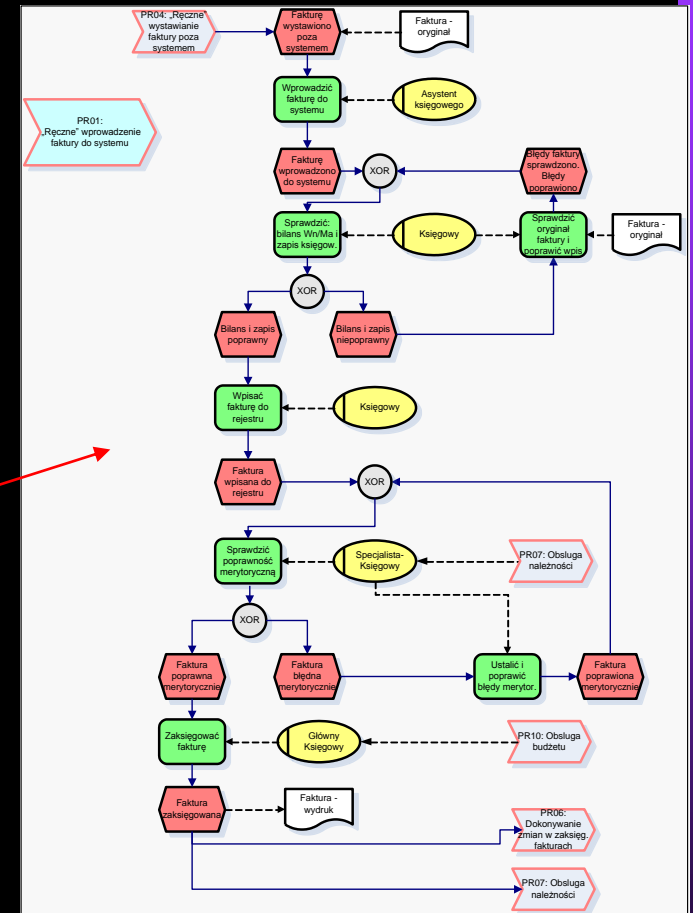
# Process Modelling and Mapping / ARIS IDS Sheer (EPC)
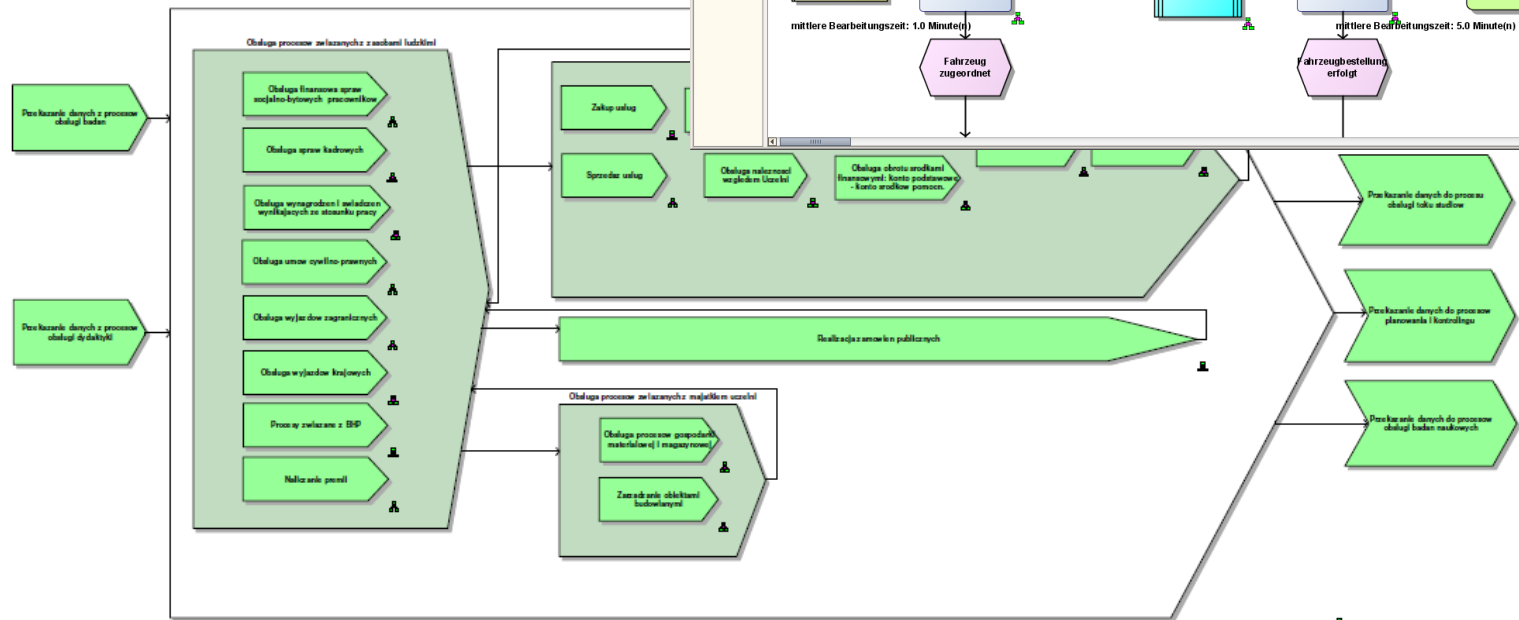
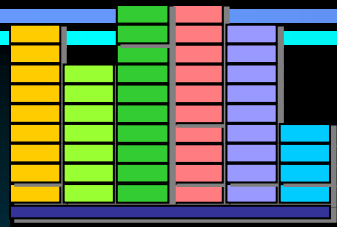# Process Modelling / BPMN (Business Process Model and Notation) by Bizagi

# Process Modelling and Mapping / IBM Blueworks

# SCM

## Supply Chain Management
### software solutions

# SAP SCM solution architecture

CRM

SRM

SEM

APO

KW

## ERP (R/3)

SD
MM
PP
QM
PM
HR
FI
CO
AM
PS
WF
IS
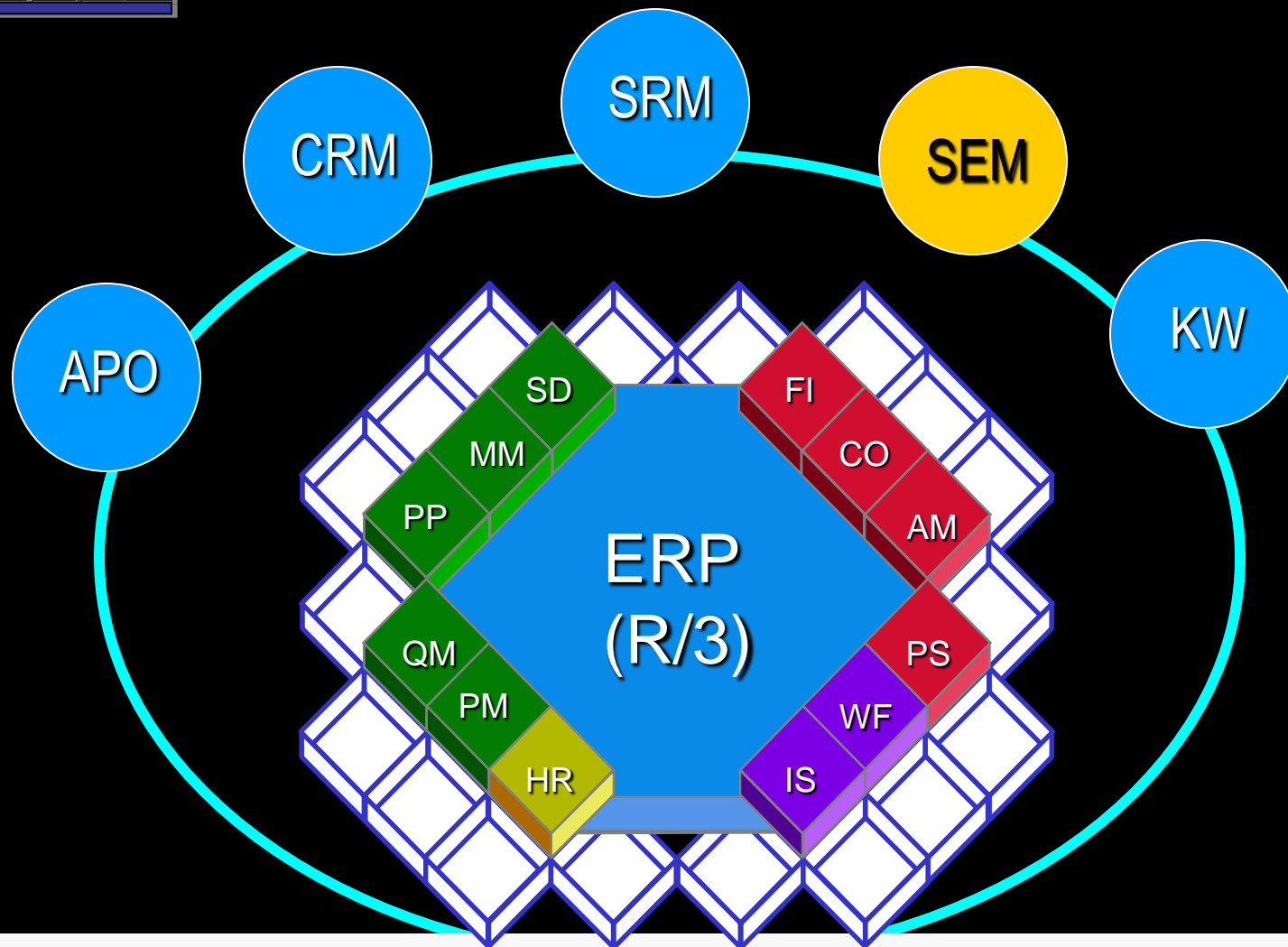
SAP Web Application Server 6,20
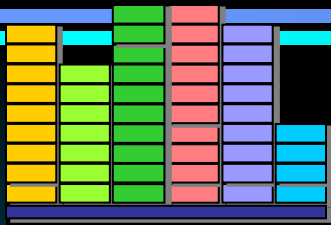
# SAP SCM solution map

| | | | |
|---|---|---|---|
| **Strategic Planning** | **Strategic Supply Chain Design** | | **Strategic Sourcing** |
| **Demand Planning** | **Forecasting & Lifecycle Planning** | **Promotion Planning** | **Consensus Demand Planning** |
| **Supply Planning** | **Safety Stock Planning** / **Supply Network Planning & Outsourcing** | **Distribution Planning** / **Customer Collaboration** | **Supplier Collaboration** |
| **Procurement** | **Purchase Order Processing** | **Receipt Confirmation** | **Invoice Verification** |
| **Manufacturing** | **Production Planning & Detailed Scheduling** | | **Manufacturing Execution** |
| **Warehousing** | **Inbound Processing** / **Outbound Processing** | **Cross Docking** | **Warehousing & Storage** / **Physical Inventory** |
| **Order Fulfillment** | **Sales Order Processing** | **Logistics Coordination** | **Billing** |
| **Transportation** | **Transportation Planning** | **Transportation Execution** | **Freight Costing** |
| **Visibility** | **Procurement Visibility** / **Manufacturing Visibility** | **Fulfillment Visibility** | **Transportation Visibility** / **Supply Chain Analytics** |

http://www.erpgenie.com/sap/mysap/images/mySAP_Supply_Chain_Management_Solution_Map.pdf
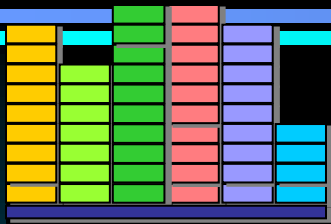
# **SAP SCM** business solution map

| Strategic Planning | Strategic Supply Chain Design | Strategic Sourcing |
|---|---|---|

## mySAP Supply Chain Management

### Strategic Planning

| Strategic Supply Chain Design | Strategic Sourcing |
|---|---|
| ● Supply Chain Definition (S51, S1) | ● Long-term Planning (S47, S51, B12, S64) |
| ● Supply Chain Monitoring (S1, S51) | ● Bid Management (S47, S51, S64) |
| ● Alert Monitoring (S1, S51) | ● Contract Management (S51, S47, S64) |
| | ● Catalog Management (S51, S47, S64) |
| | ● Source Determination (S47, S51, S64) |

| ● SAP Product Available | Ⓟ Partner Product Available | Sxx, Vxx, Bxx | SAP Product & Service |
|---|---|---|---|
| ► SAP Product Available with Future Releases | ◗ Partner Product Available with Future Releases | Pxx | Partner Product |
| ◉ Future Focus | ◖ Collaborative Business Map Available | For more information see: http://www.sap.com | |

THE BEST-RUN BUSINESSES RUN SAP
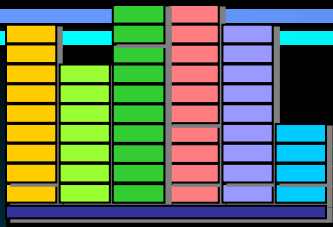
# **SAP SCM** business solution

## Key objectives and benefits :

1.  Respond quickly to **changes** in supply and demand.

2.  Determine accurate customer delivery dates.

3.  Optimize inventory, labor, resources, and space.

4.  Leverage analytics to monitor and measure

    performance.

5.  Develop risk avoidance and mitigation strategies.

6.  Ensure compliance with international trade regulations.

# SAP SCM – transport / scheduling



**Shipment Schedule**

**Navigation Tree**

**Alert Monitor**

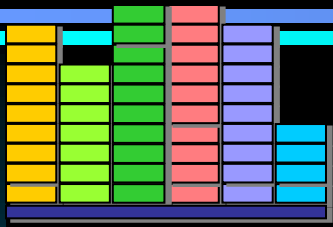# **SAP SCM** / route planning

# WMS / VMI / RFID
# Flexsim System

# logistics software solutions

## WMS – Warehouse Management System:

- Software solution that plays a key part of the supply chain mgmt. in terms of **material requierments**.

- The main objective is to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, putaway and picking operations (Warehouse Management - WM).

- It optimizes stock put-away based on real-time information about the status of bin utilization.

- WMS can be stand alone systems, or modules of an ERP system or SCM suite.

# logistics software solutions

## WMS – Warehouse Management System:
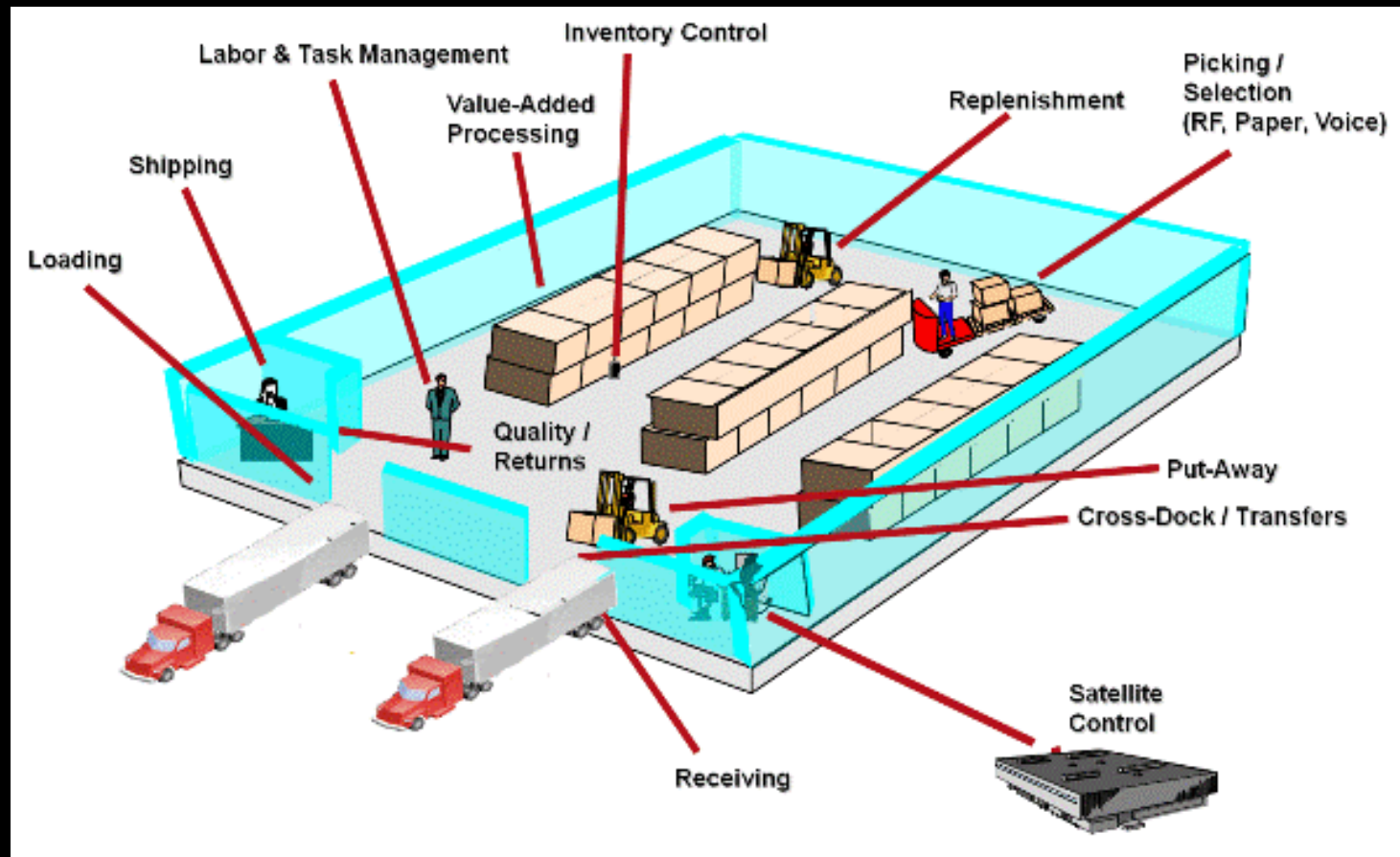
# logistics software solutions

**VMI** – **Vendor-Managed Inventory**:

- Software solution that helps the buyer to control (vendor, retail store owner) of a product provides certain information to a supplier of that product and the supplier takes full responsibility for maintaining an agreed inventory of the material (PULL STRATEGY).

- VMI ussually works together with RFID technology.

- The successful business models used by Wal-Mart and many other big chain retailers.
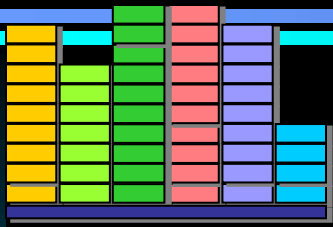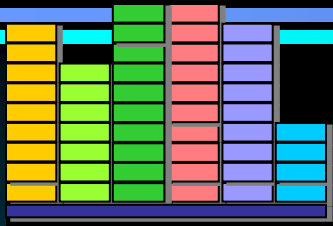
# logistics software solutions

**RFID** – **Radio-Frequency IDentification**:

- A wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking.
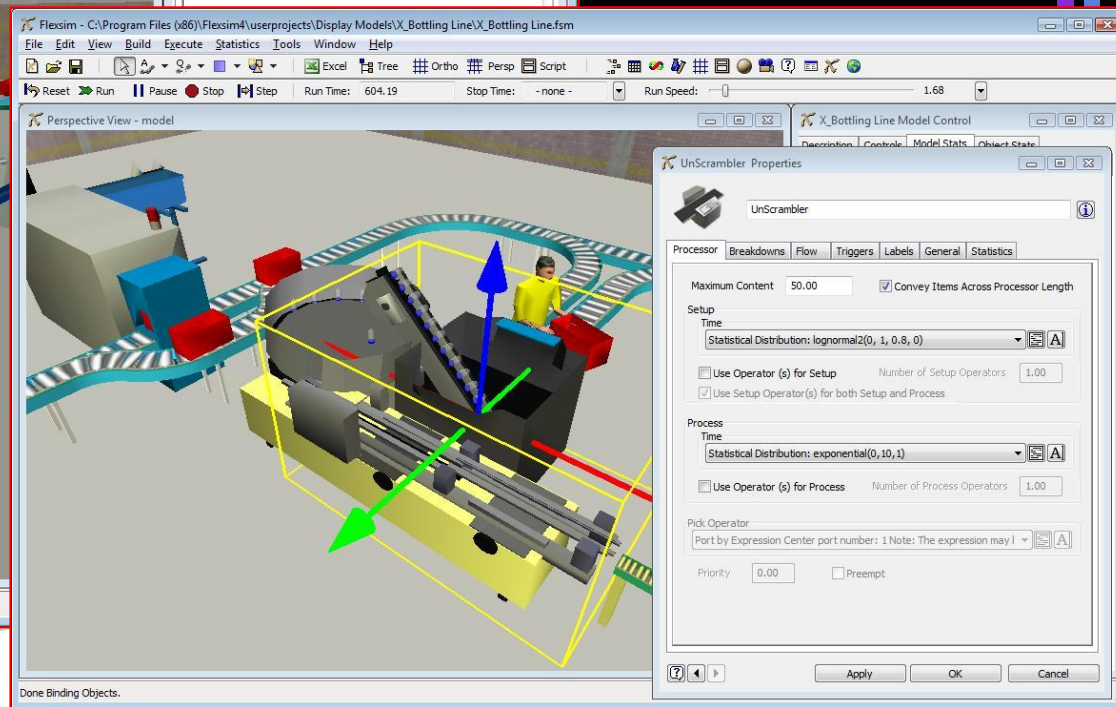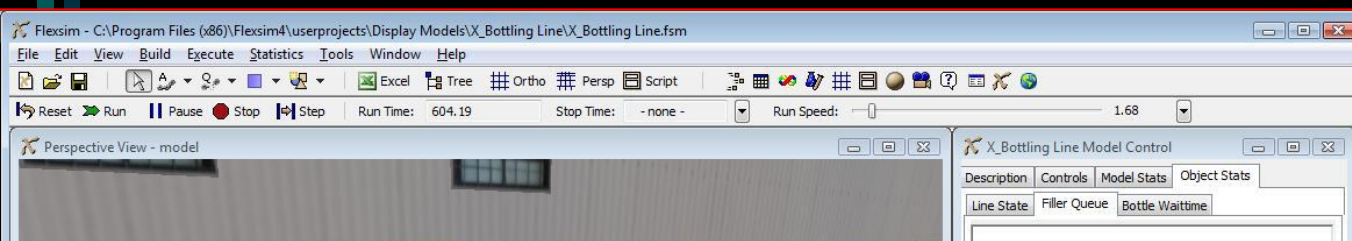
# logistics software solutions

**RFID** – **key functionalities/benefits**:

- Asset tracking and monitoring – increase security

- Stock management and stock availability

- No errors in terms of product data handling

- Shipping consolidation

- Shipping loading and tracking – warehouse mgmt.

- Item tracking within a plant

- Warehouse efficiency, productivity and accuracy

- Reduce overall costs – e.i. phantom stock problems

Mangan, Lalwani, Butcher, Javadpour, Global Logistics and Supply Chain Management, Wiley & Sons, 2012.

# logistics software solutions
## Flexim – logistics processes designer

# Questions ?

- dr Marian Krupa

# Exam Questions (3):

- ✓ Define the role of information in contemporary global supply chain model.

- ✓ Define various information technologies (IT) applications employed in logistics and global SCM.

- ✓ Discuss key barriers in area of IT implemmentation in the network of organisations / supply chain.

- ✓ What are the key rules BPM methodology.