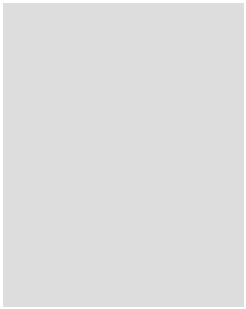




## Introduction to Supply Chain Management

Kai A. Simon, PhD

Consulting Manager; IMG – The Information Management Group  
Research Fellow; Viktoria Institute Sweden



---

# Disposition

- **Part 1 – SCM concept**
  - Definition, potential, drivers
  - Conceptual basics
  - Approaches to Inventory Management
  - SCOR
  - The role of information technology: APS
  
- **Part 2 – SCM in practice**
  - Global Supply Chain Strategy in the Hospital Supply Industry

---

## What is Supply Chain Management?

- Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies.
- Keywords
  - Flow of materials, information and finances
  - Move in a process
  - Within and across company boundaries
- Inventory Management plays a crucial role as a mean for cost reduction along the supply chain

## Is Supply Chain Management a new concept?

- MRP (Material Resource Planning) and MRP II (Manufacturing Requirements Planning) have been around for many years
- Early adopters of advanced SCM in the automotive industry and Retail/FMCG
  - Just-in-time
  - Quick Response, Efficient Customer Response
- Diffusion of SCM as a holistic approach from source-of-supply to point-of-consumption since the mid `90s



The Illustrated History of Commerce, Chapter 17:  
Pioneers in online vendor management

---

## MRP & MRP II Differences

### MRP Materials Requirements Planning

- Uses BoM (bill of material) data, inventory data and the MPS (Master Production Schedule) to calculate requirements for materials
- Recommendations for replenishment orders
- Recommendations to reschedule open orders according to due and need dates

### MRP II Manufacturing Resource Planning

- Outgrowth of MRP
- A method for the effective planning of all manufacturing resources
- Includes more functionality than MRP, e.g. Production Planning, Master Production Scheduling, Capacity Requirements Planning
- Can also include ERP functions, such as inventory projection, shipping budgets, purchase commitment reports

---

## SCM Potential (cum grano salis)

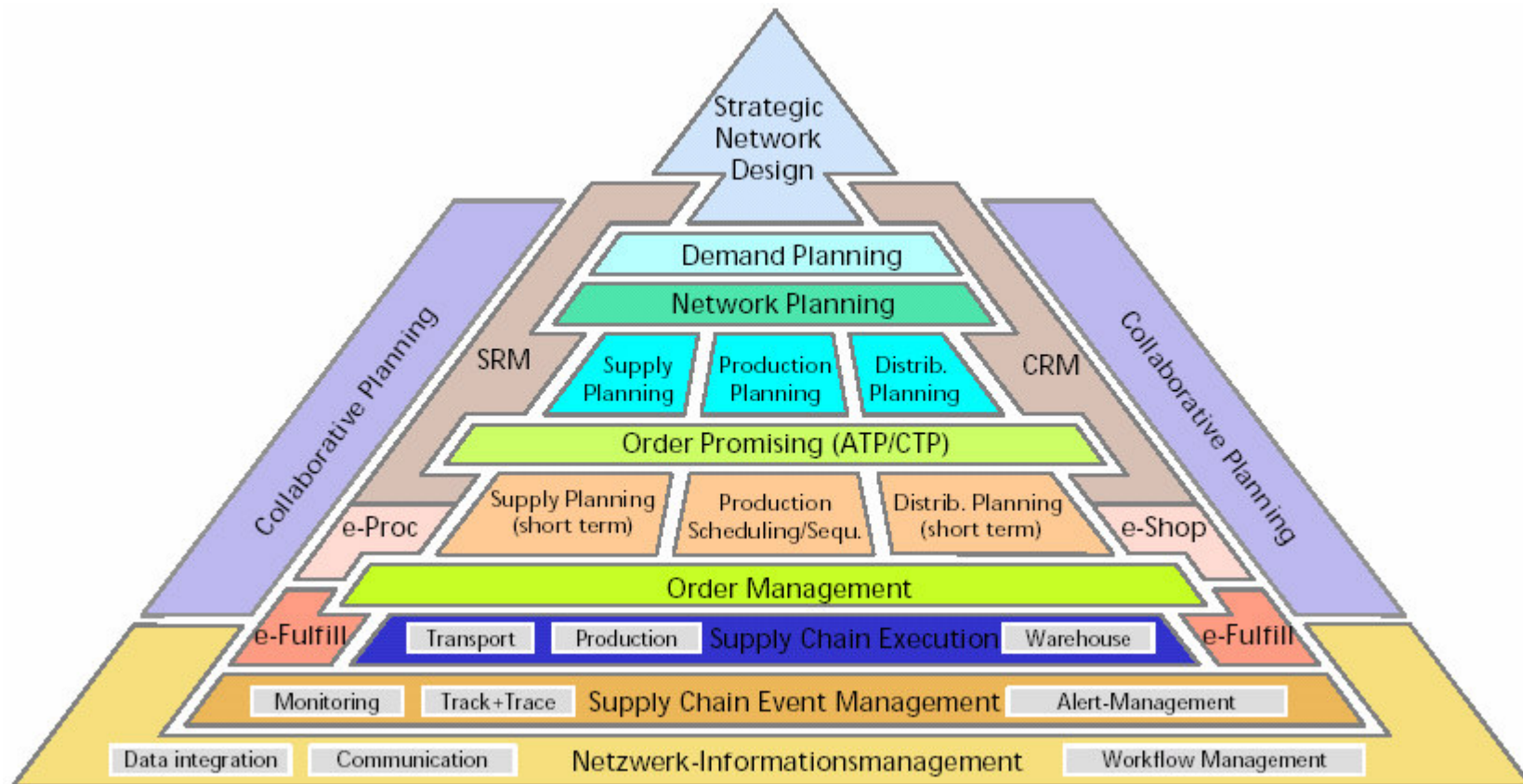
- Most companies aim at internal and external processes
- Total saving of 20-50% can potentially be realized
  - Inventory reduction and process optimization can reduce 25-60% of capital tied-up
    - This requires collaborative efforts in SC planning and execution, such as VMI, CPFR
  - Cost reduction in production planning is estimated to 10-20%
- Several factors influence the degree of reaped benefits
  - Degree of process change (and willingness to do so)
  - Level of internal and external collaboration
  - Technology deployment
  - ... and all other factors that are relevant for making a change initiative successful

---

## Drivers of SCM initiatives

- Internal drivers
  - More than 90% are striving for process optimization, i.e. BPR. Process improvement has three main target areas:
    - Time
    - Quality
    - Cost
  - 83% are primarily aiming at cost reduction
  
- External drivers
  - 70% mention customer requirements
  - 35% see competitors as major driving force
  - 33% react to demands from suppliers

# Fraunhofer Institute SCM Reference Model



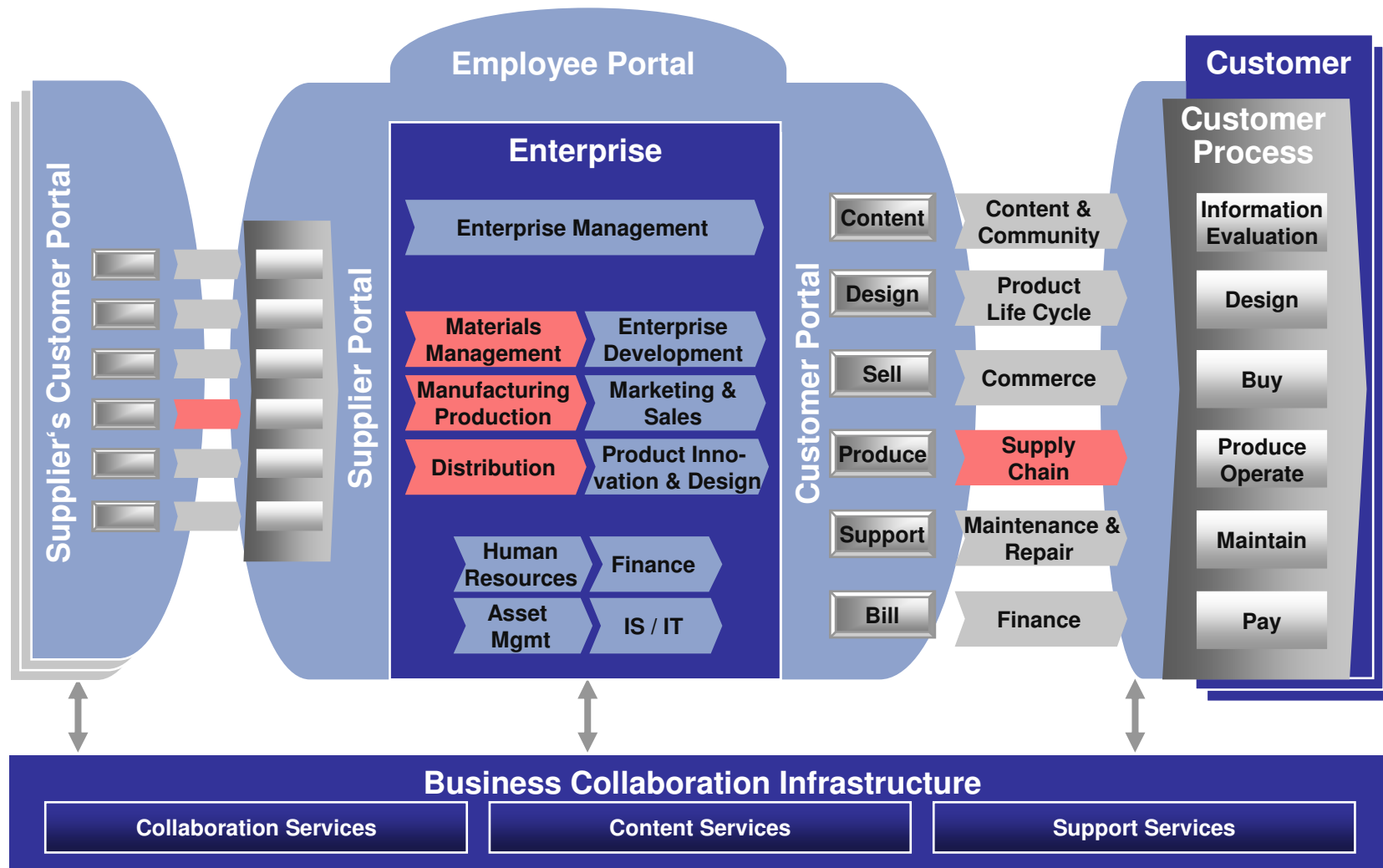
- Three main areas
  - SC Planning
  - SC Execution
  - Basic Tasks (Infrastructure Management, ...)

# SAP SCM Business Map

<b>Supply Chain Planning</b>	Supply Chain Design	Demand Planning	Supply Planning	Distribution Planning	Production Planning	Transportation Planning
<b>Supply Chain Execution</b>	Materials Management	Manufacturing	Order Promising & Delivery	Warehouse Management	Transportation Execution	Foreign Trade/Legal Services
<b>Supply Chain Coordination</b>	Supply Chain Event Management		Supply Chain Performance Management		Fulfillment Coordination	
<b>Supply Chain Collaboration</b>	Supply Chain Portal		Collaboration Processes		Supply Chain Integration	

- 4 main areas
  - SC Planning
  - SC Execution
  - SC Coordination
  - SC Collaboration

# Supply Chain Management in a Value Chain Perspective – The BMIA

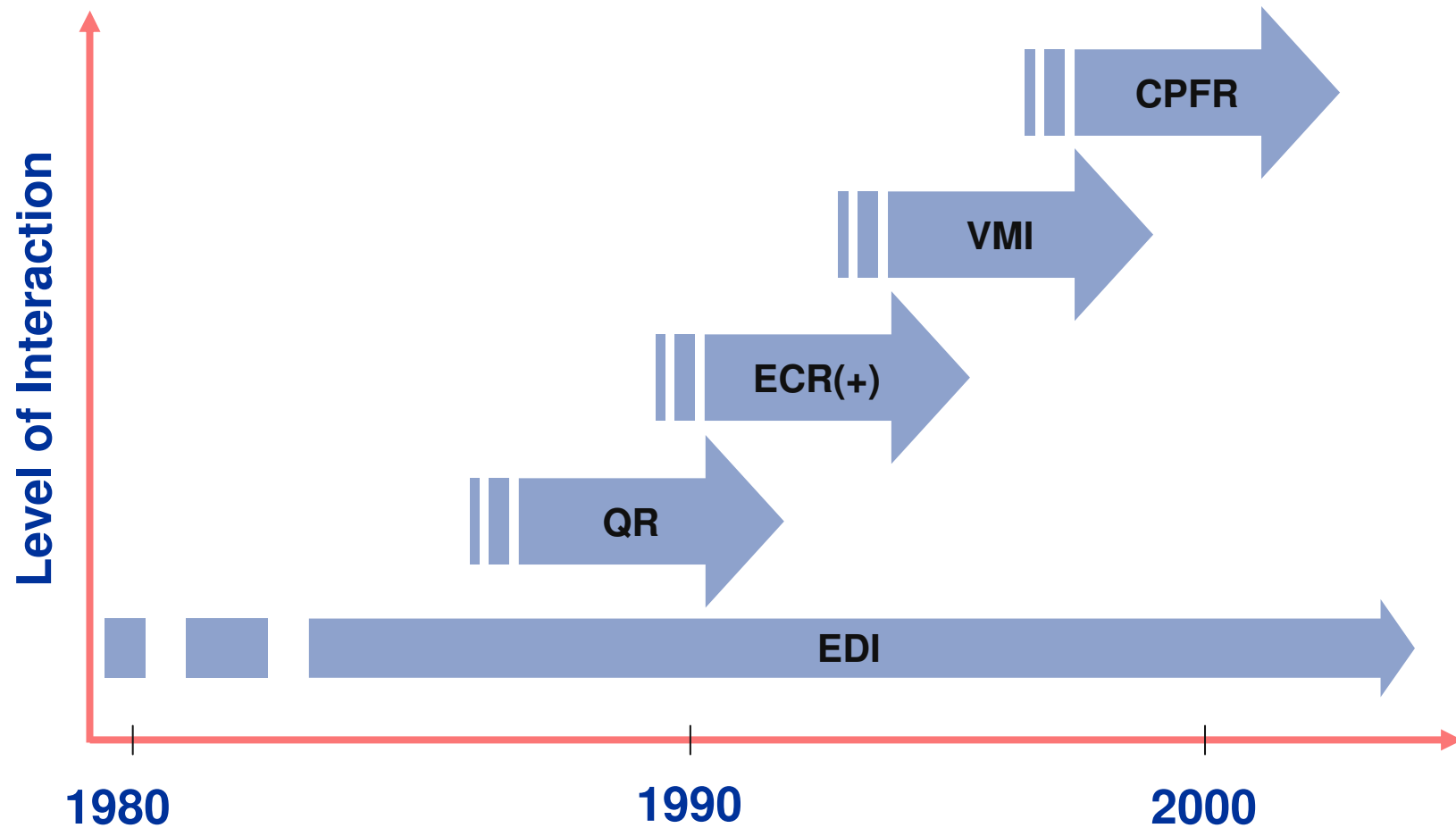


---

# Collaborative Inventory Management Concepts

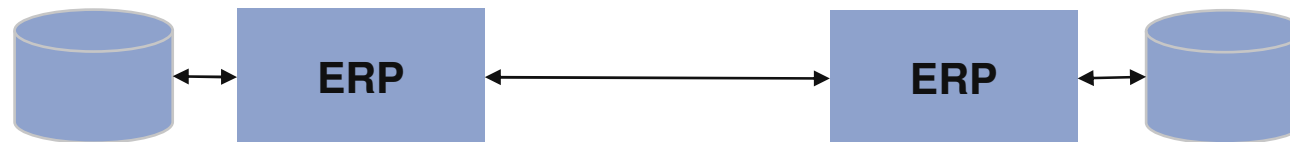
- Content and preconditions, conceptual differences
  - EDI
  - Quick Response
  - Efficient Customer Response
  - Vendor Managed Inventory
  - CPFR
  
- 3PL – 3<sup>rd</sup> Party Logistics
  
- Performance Indicators

# The Evolution of Collaborative Inventory Management



# EDI – Electronic Data Interchange

- The basis for all scenarios
- Exchange of standardized documents
  - Standard today is EDIFACT, with industry specific adaptations
  - Local standards (GENCOD, TRADACOMS, ...) no longer relevant
  - Proprietary connections vs Web-EDI
  - Packaging of EDI-messages in XML structures
  - 1:1 data exchange
- Increased execution efficiency (error reduction, speed), but no per se improvement of planning activities
- Typical documents: order, confirmation, ASN, invoice

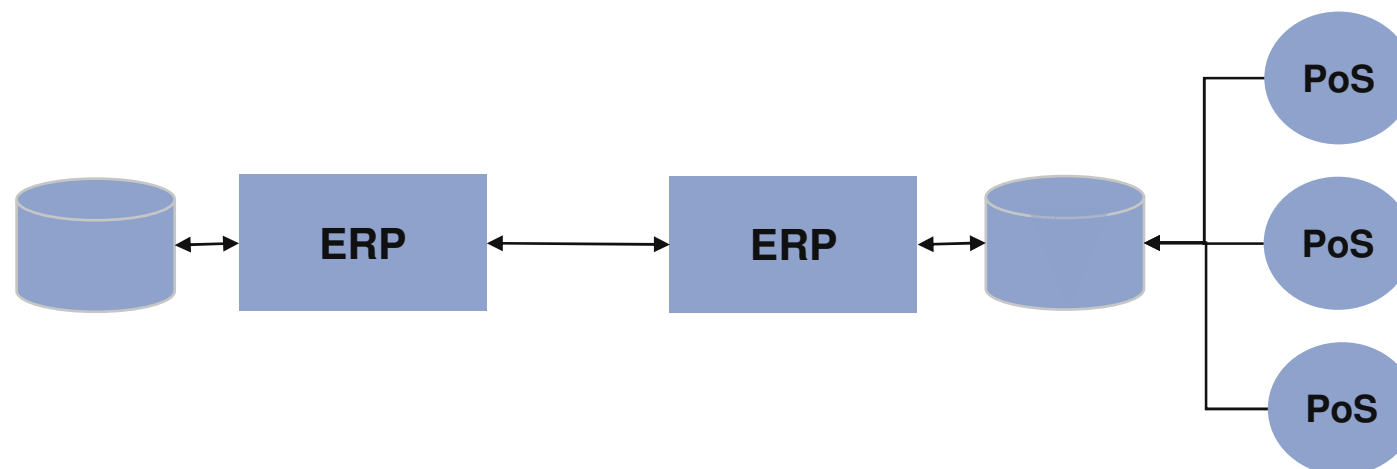


## Quick Response

- Transfer of PoS-Daten to suppliers
  - Alternative 1: full aggregation
  - Alternative 2: RDC inventory levels or level reductions
  - Alternative 3: analytical PoS data (and alt 2)
- Synchronization of demand and internation planning (production, inventory) at supplier's side
- Ordering typically still based on order generation by customer, use of PoS-data by supplier for increased forecast accuracy

**Decision:**  
- Which alternative?

**Pre-condition:**  
- IT systems fit



# Efficient Customer Response

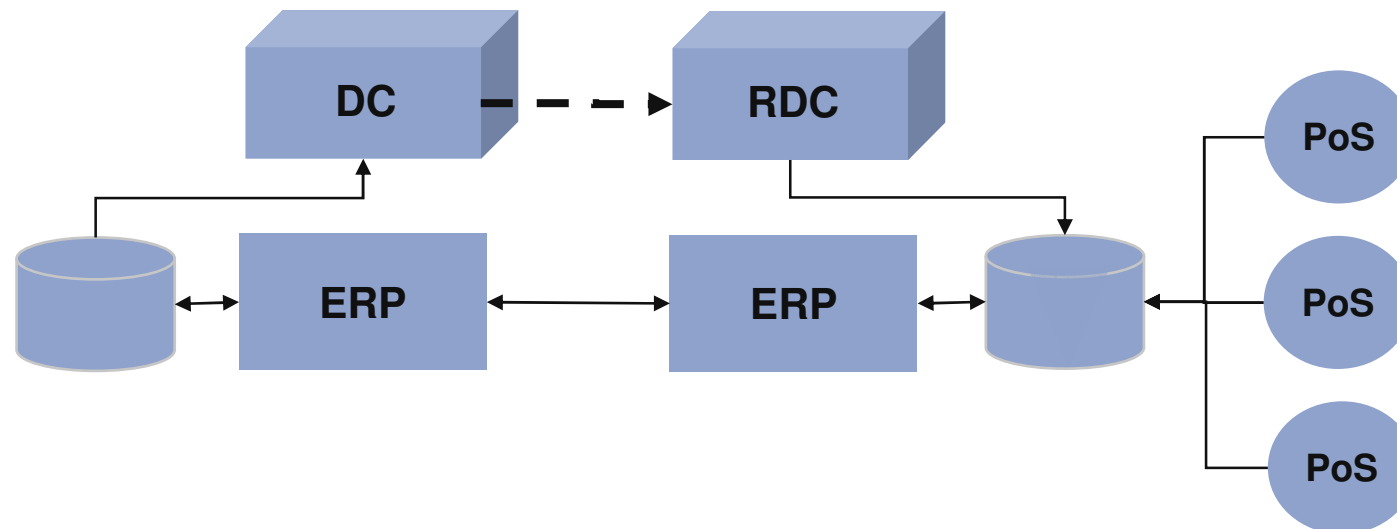
- (Advanced) Continuous Replenishment
  - Continuous replenishment of customer stock through supplier to jointly agreed levels
  - Advanced version: the supplier can, if still meeting the SLA, autonomously reduce the stock level
- 2 options
  - Alternative 1: order based, i.e. customer ERP system generates an order document
  - Alternative 2: Transfer of inventory level, order is generated by supplier (semi VMI)

**Decisions:**

- Advanced?
- Alternative 1 or 2?
- Consignment?

**-Pre-conditions:**

- IT-systems
- QR Alternative 2 or 3
- Inventory level defined
- SLA



# Vendor Managed Inventory

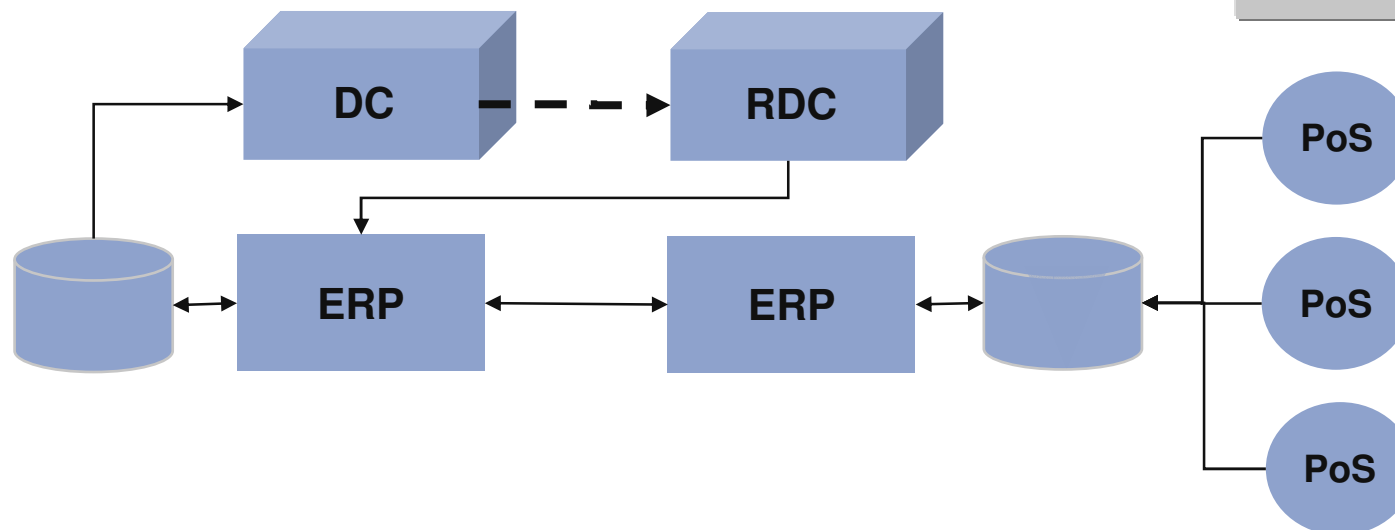
- Supplier receives PoS- and inventory data from the customer
  - Add. option 1: customer order stock
  - Add. option 2: customer sales forecast
- Supplier develops and improves inventory planning
  - Order is always generated by supplier

**Decisions:**

- Add. options?
- Consignment?

**Pre-Conditions:**

- IT systems
- QR alternative 2 or 3
- Inventory level def. (supplier)
- SLA
- Process definitions
- Granularity of Sales Forecast (if opt. 2)



## CPFR - Collaborative Planning, Forecasting and Replenishment

- Joint development of front-end agreement and strategic business plan
- Joint planning of regular activities and exception handling mechanisms as iterative process
  - Sales Forecast
  - Order Forecast
- Combined with VMI for executions
  - Sub-optimum when combined with Continuous Replenishment

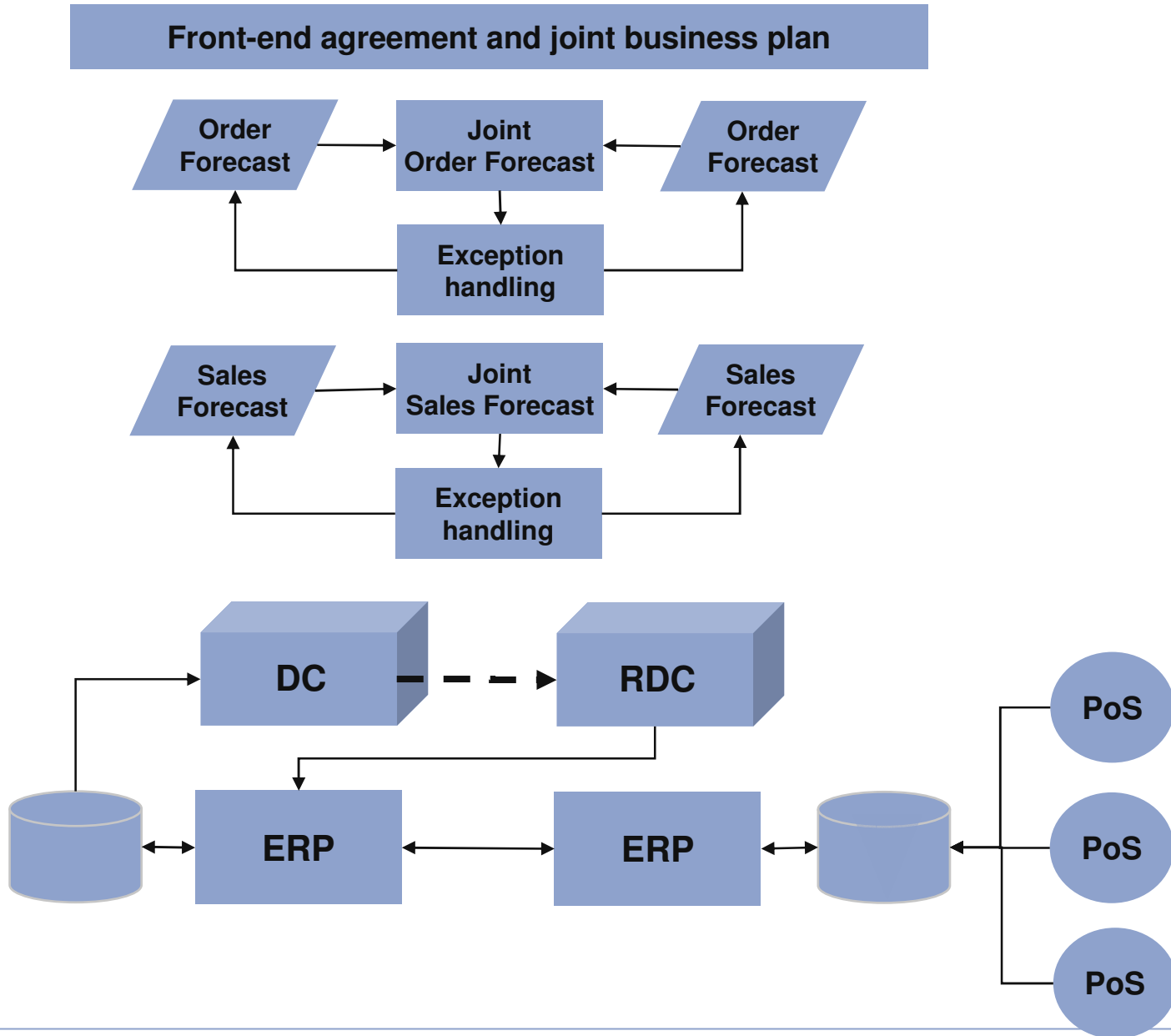
### **Decisions:**

- Consignment?
- Process lead

### **Pre-conditions:**

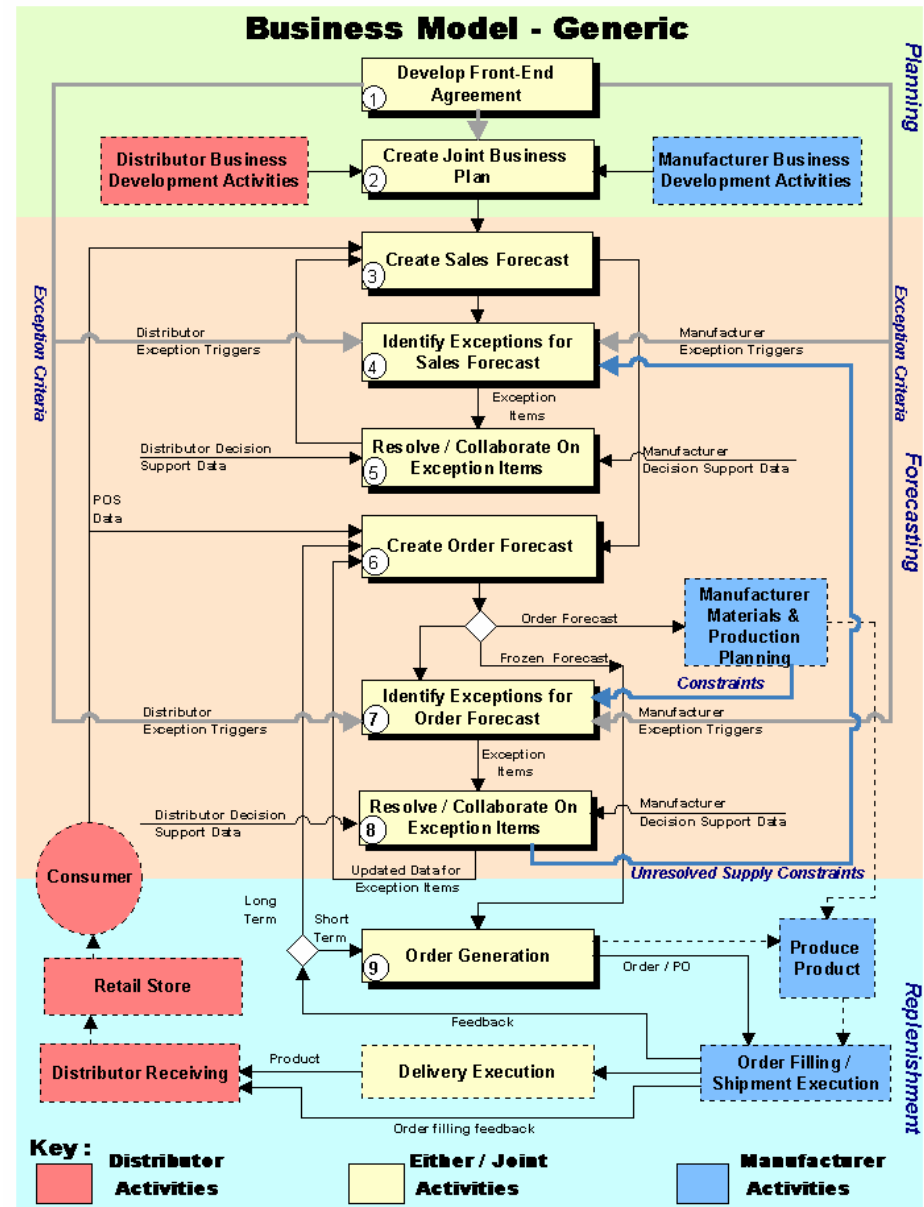
- IT systems
- Front-end agreement
- Business Plan
- Replenishment/VMI
- SLA
- Process definitions
- Granularity of Sales/Order Forecast

# CPFR basic structure



# CPFR activity overview

- Does not include the financial transactions



## 3PL – Third Party Logistics

- Involvement of an external logistics service provider for logistics executions
- The 3PL provider can take over the following elements
  - Quick Response
  - ECR
  - VMI
- Aspects to consider when involving a 3PL
  - Customer view: What data should be made accessible to the 3PL (inventory levels, PoS data, order data)?
  - Supplier view: At what level should the collaboration with the 3PL take place?

### Decisions:

- Relation 3PL-Customer
- Relation 3PL-Supplier

### Pre-conditions:

- IT systems
- SLA
- Process definitions
- Replenishment/  
VMI/CPFR (depending  
on level of 3PL inte-  
gration)

---

# Performance Indicators in Collaborative Inventory Management - Examples

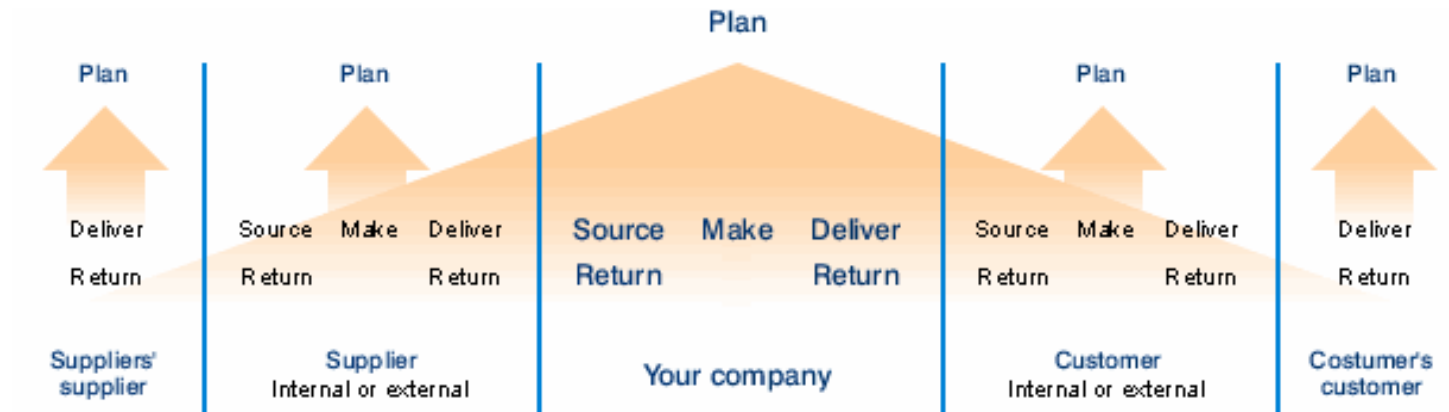
- Inventory levels
  - Finished goods
  - WIP (Work-in-progress)
  - Raw material
- Forecast accuracy
  - Sales
  - Order
- Service Level
  - Available to promise
  - Out-of-Stock
- Time
  - Order-to-delivery
- Planning
  - Promotion
  - Production
  - Transport
- Changes
  - Promotion planning
  - New products
  - Rush orders
- Growth
  - Revenue
  - Contribution
- Data transfer/accuracy
  - Orders
  - Invoices
- Logistics
  - Full truck loads
  - Empty trucks
  - Logistics cost

---

## SCOR is the most prominent approach to SCM

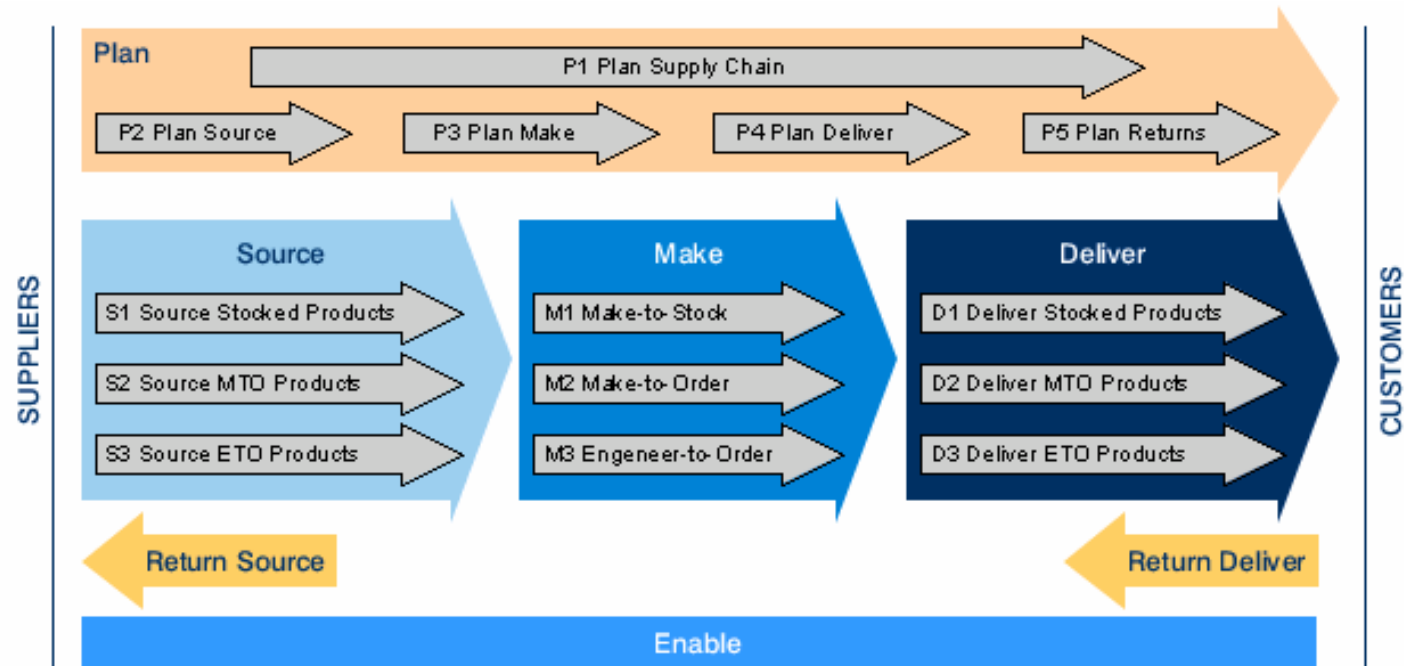
- SCOR: Supply Chain Operations Reference Model
- Span of SCOR
  - All supplier / customer interactions
    - Order entry through paid invoice
  - All physical material transactions
    - From your supplier's supplier to your customer's customer, including equipment, supplies, spare parts, bulk product, software, etc
  - All market interactions
    - From the understanding of aggregate demand to the fulfillment of each order
  - Returns

## SCOR is organized around 5 management processes



- Plan
- Source
- Make
- Deliver
- Return

# SCOR Processes



# Structure of SCOR at different levels

		Level			
		#	Description	Schematic	Comments
↑ Supply Chain Operations Reference model ↓ ↑ Not in Scope	1		Top level (process types)		<p>Level 1 defines the scope and content for the Supply Chain Operations Reference model</p> <p>Here basis of competition performance targets are set</p>
	2		Configuration level (process categories)		<p>A company's supply chain can be "configured-to-order" at Level 2 from approximately 24 core "process categories"</p> <p>Companies implement their operations strategy through their unique supply chain configuration</p>
	3		Process Element Level (decompose processes) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>P3.1 Identify, prioritise, and aggregate production requirements</p> <p>P3.2 Identify, assess, and aggregate production resources</p> <p>P3.3 Balance production resources with production requirements</p> <p>P3.4 Establish detailed production plans</p> </div>		<p>Level 3 defines a company's ability to compete successfully in its chosen markets and consists of:</p> <ul style="list-style-type: none"> <li>■ Process element definitions</li> <li>■ Process element information inputs and outputs</li> <li>■ Process performance metrics</li> <li>■ Best practices, where applicable</li> <li>■ System capabilities required to support best practices</li> </ul> <p>Companies "fine tune" their Operations Strategy at Level 3</p>
	4		Implementation level (decompose process elements)		<p>Companies implement specific supply chain management practices at this level</p> <p>Level 4 defines practices to achieve competitive advantage and to adapt to changing business conditions</p>

---

# The role of information technology

- Technology as enabler, not driver
- Use of IT for
  - SC planning
    - Demand planning
    - Production planning
    - Distribution planning
  - SC execution
    - In-/outbound logistics
    - Support of QR, ECR, CPFR, ...
    - Event management, visibility

---

## Shortcomings of „traditional“ MRP/MRP II systems

- Not designed for dynamic demands, short life-cycles, and high numbers of product variations
- Separate material and capacity planning
- Limited simulation and optimization capability
- No real-time planning
- Short-term adaptation of plans is rarely possible
- No integrated global/distributed planning approach
  - The global company is treated as many local firms

---

## The use of APS technology (Advanced Planning and Scheduling)

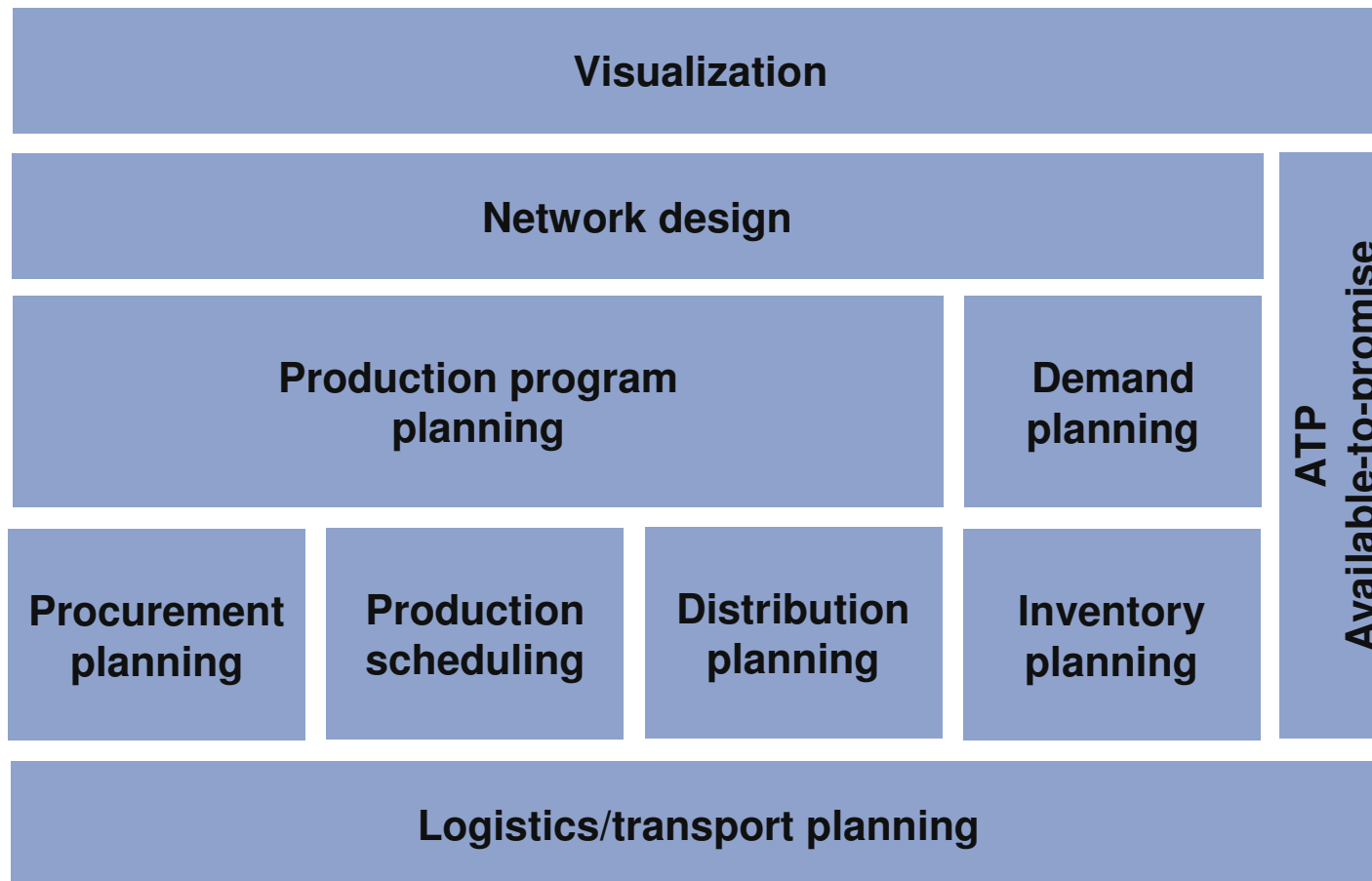
- Characterized by
  - Very high computing capacity (hardware)
  - Complex algorithms, operations research based, heuristics methods, linear programming
  - Simultaneous planning of materials and capacities, including constraints
  - Simultaneous planning of multiple organizational entities and their relations, e.g. multiple plants and logistics streams
  - Simulation capability and incremental planning
  
- Creation of transparency in SC planning

---

## Two segments of APS

- ERP vendors – offering SCM/APS tools as part of their ERP suites
  - SAP (APO)
  - Oracle
  - ...
  
- Specialized vendors
  - i2
  - Manugistics
  - Numetrix (Acquired by J D Edwards)
  
- Vendors covering specific functions
  - E.g. BridgePoint

# APS components



---

Any questions?

