

# **Supply Chain Planning System**

**5 March 2008**

# What is Planning

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- Planning is the process of deciding how we will use all the kinds of resources that ultimately provide product to end customers.

# What is Planning?

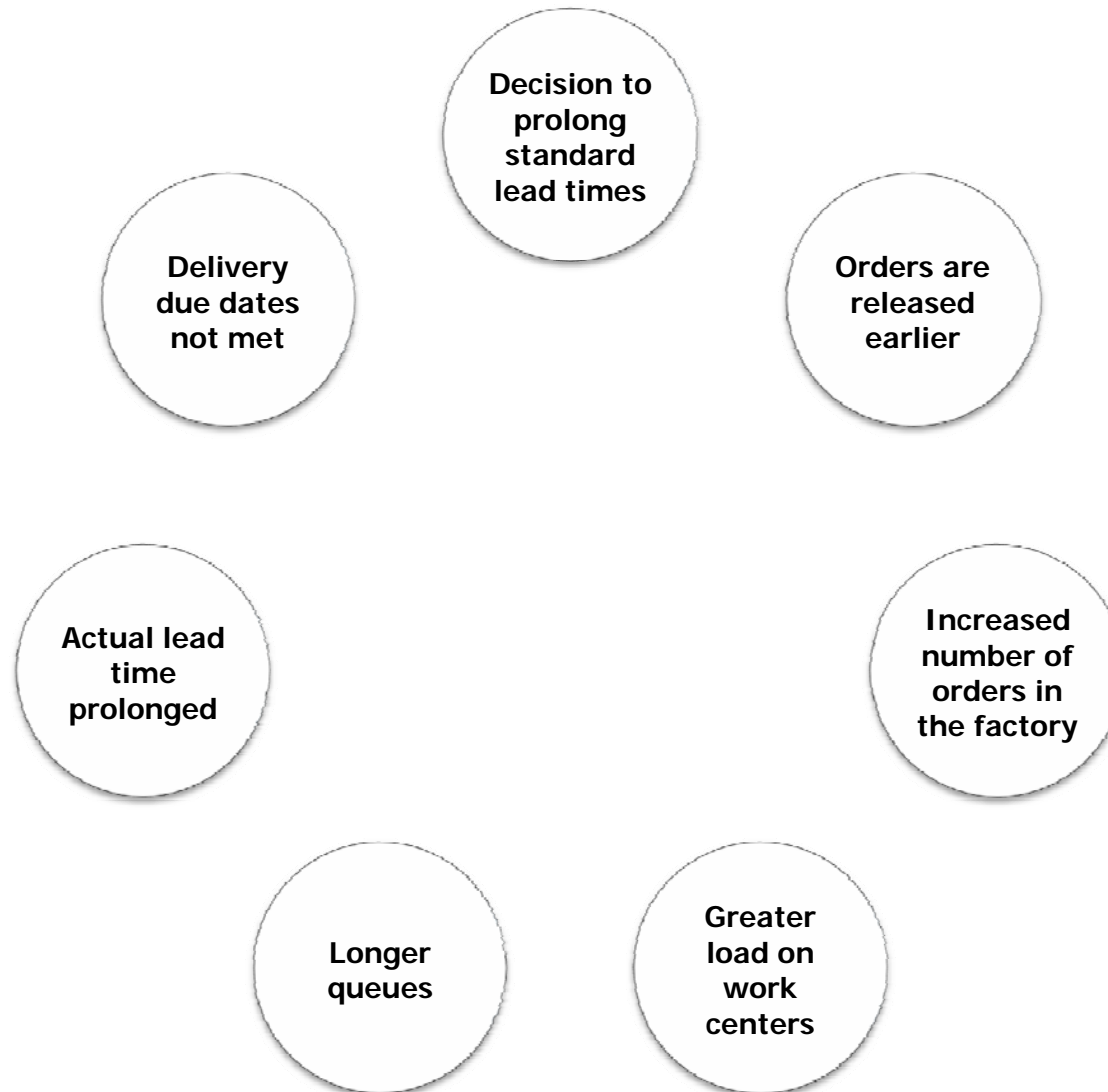
- To make decisions that commit resources, and secondarily to coordinate activities
- Take all relevant information
- No one best way to plan for all businesses and supply chains
- Not plan when there is neither information nor decisions to make
- Process supported by organization, data, and software
- Replanning is the norm
- To control and minimize risk from future changes, but seldom eliminate it completely
- Flexible planning is effective but no substitute for well-designed strategies, facilities, and operating processes

# Definition

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- **Time horizon**
- **Time bucket**
- **Time interval**

# Vicious Cycle of Planning Problem





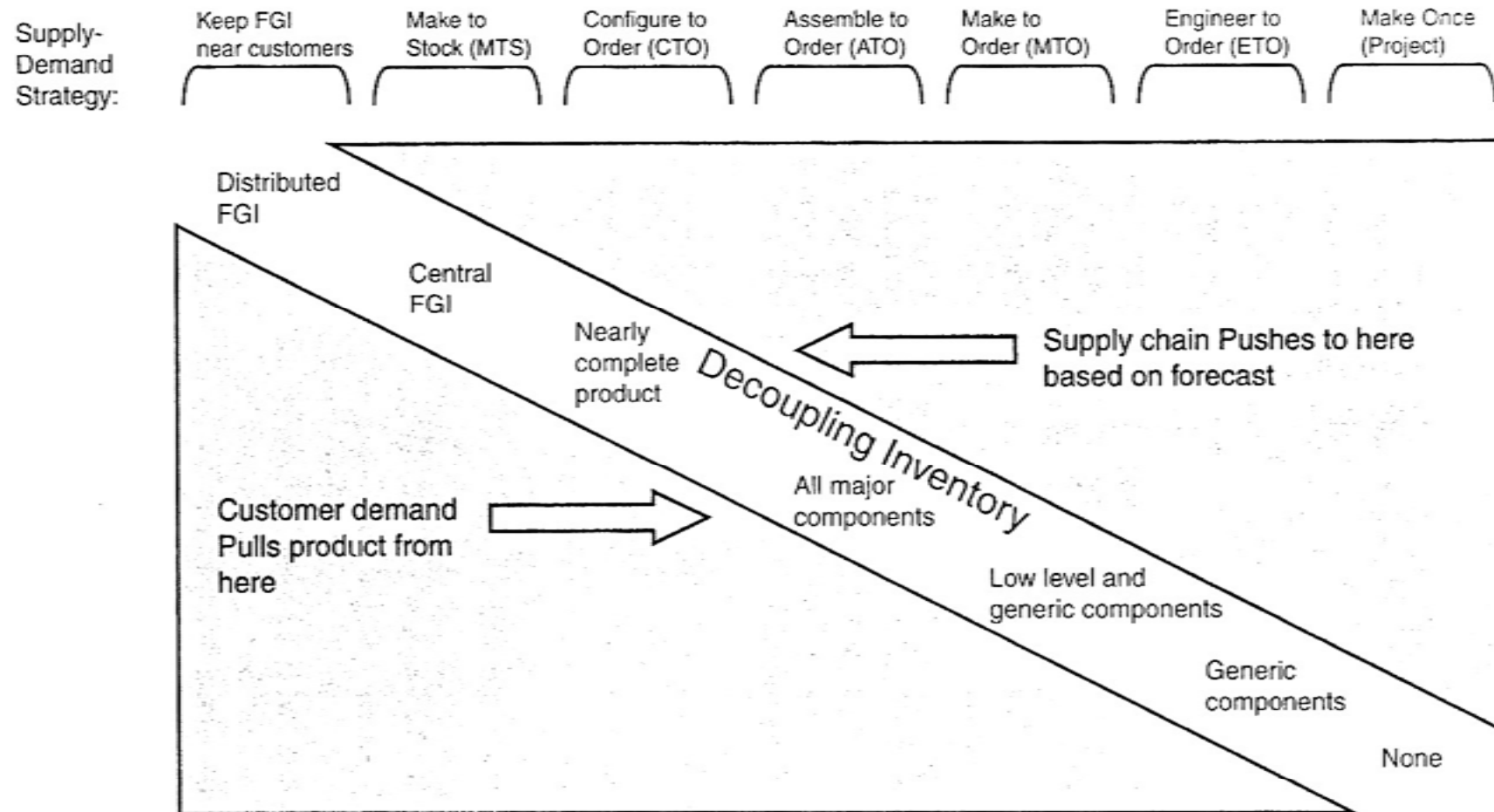
# Different Business Environments

		Product mix			
Process pattern	Few of each customer	Low volume; many products	High volume, several major products	Very high volume commodity	
Job shop (very jumbled flow)	Aerospace Commercial printer	Industrial machinery Apparel	Machine tools	Drugs, specialty chemicals	Electrical and electronics
Batch flow (less jumbled)					Automobile Tire and rubber Steel products
Worker-paced line flow					Major chemicals Paper, oil, steel Brewers, forest products
Continuous, automated, rigid flow					

# Different Business Environments

Characteristics	Job Shop	Line Flow/Batch	Assembly Line	Continuous Flow
Market	Engineer/make to order	Make to order/make to stock	Make to stock/Assemble to order	Make to stock
Number of customers	Many	Many, but fewer	Less	Few
Number of products	Many	Fewer	Fewer still	Few
Product differentiation	Customized (nonrepetitive)	Less customized (infrequent repetition)	More standardized (frequent repetition)	Standardized (frequent repetition)
Process Flow	No pattern	A few dominant patterns	Rigid flow pattern	Clear and inflexible
Number of raw materials	Often low	Low	High	Low
<b>Inventories</b>				
Raw Materials (RM)	Small	Moderate	Varies, frequent deliveries	Large, continuous deliveries
Work In Process (WIP)	Large	Moderate	Small	Very small
Finished Goods (FG)	None	Varies	High	Very high
Type of equipment	General purpose	Combination of specialized and general purpose	Specialized, low or high tech	Specialized, high tech
Definition of capacity	Fuzzy	Varies	Clear, in terms of output rates	Clear, expressed in physical terms
Bottlenecks	Shifting frequently	Shifting often, but predictable	Generally known and stationary	Known and stationary
Speed (units/day)	Slow	Moderate	Fast	Very fast
Scheduling	Uncertain, frequent changes	Frequent expediting	Process design around schedule	Inflexible, sequence dictated by technology
Operations challenges	Increasing labor and machine utilization, fast response, breaking bottlenecks	Balancing stages, designing procedures responding to diverse needs	Rebalancing line, productivity improvement, adjusting staffing levels	Avoiding down time, timing expansions, cost minimization
Process changes required by new products	Incremental	Often incremental	Incremental or radical	Always radical
QC responsibility	Direct labor	Varies	QC specialists	Process control

# Supply Chain Design

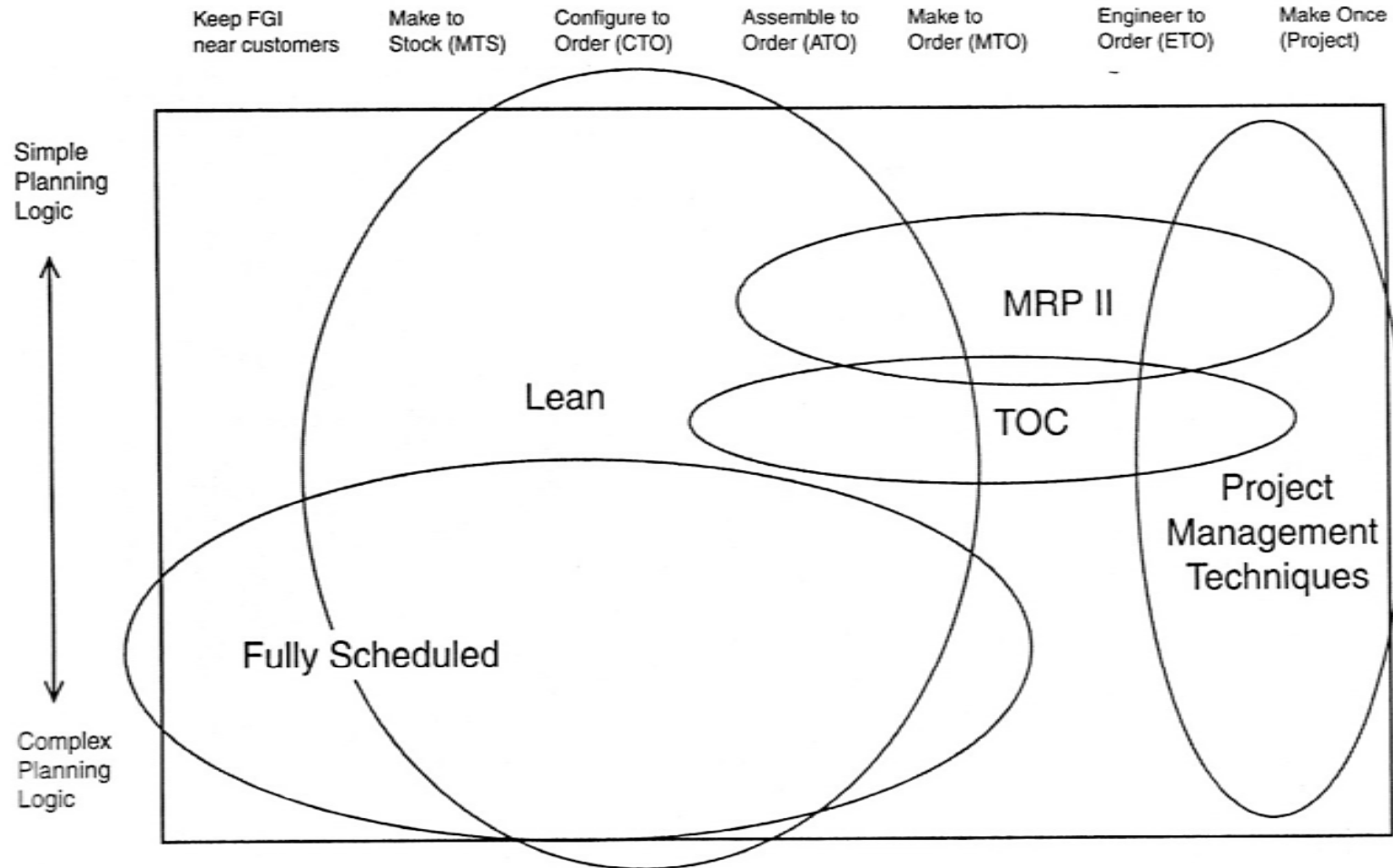


# Planning Philosophies

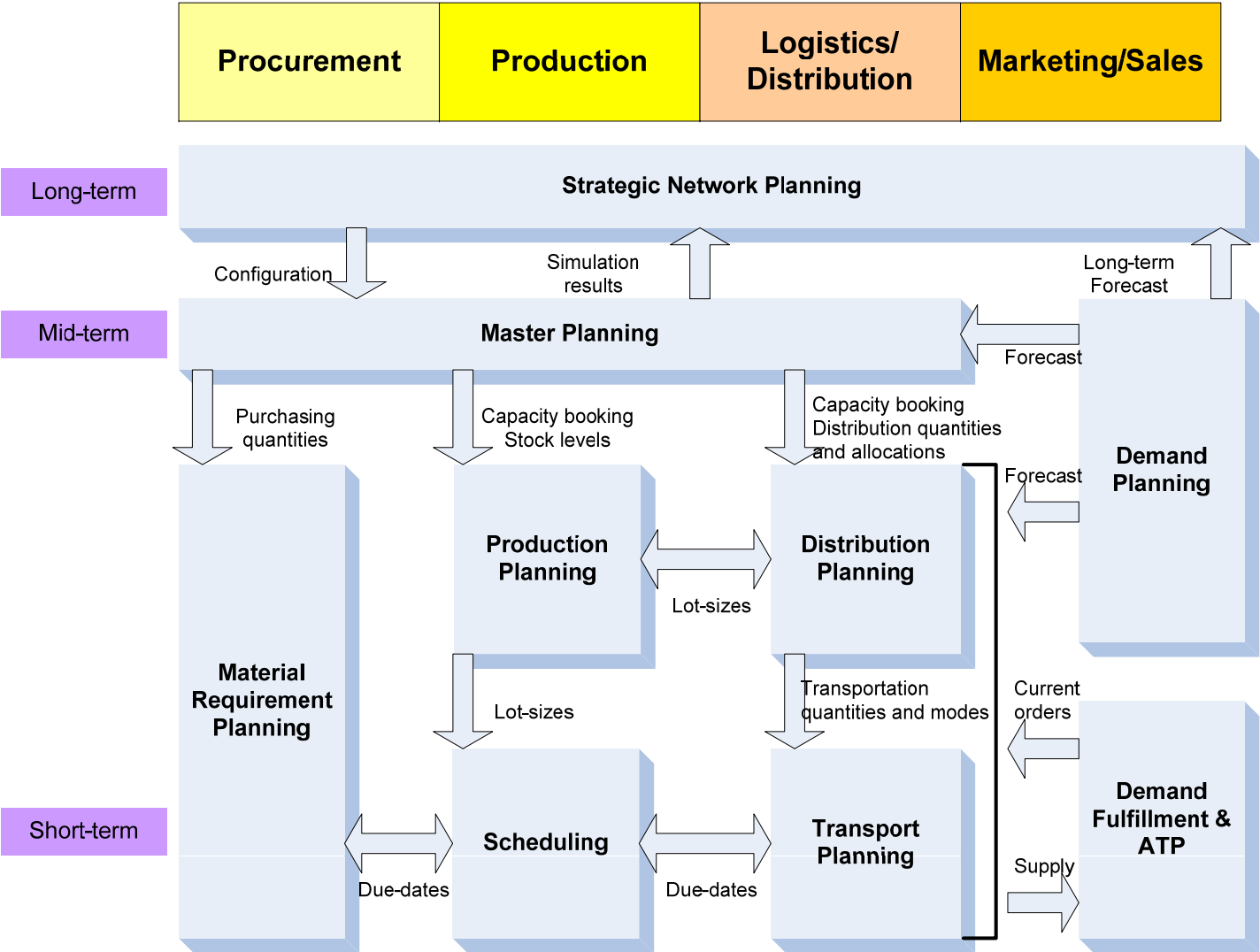
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- **Lean:** Planning for flow
- **MRP and ERP:** Driving by manufacturing orders
- **Theory of Constraints:** Managing constraints
- **Fully Scheduled:** OR-Based
- **Project Management:** One time activities

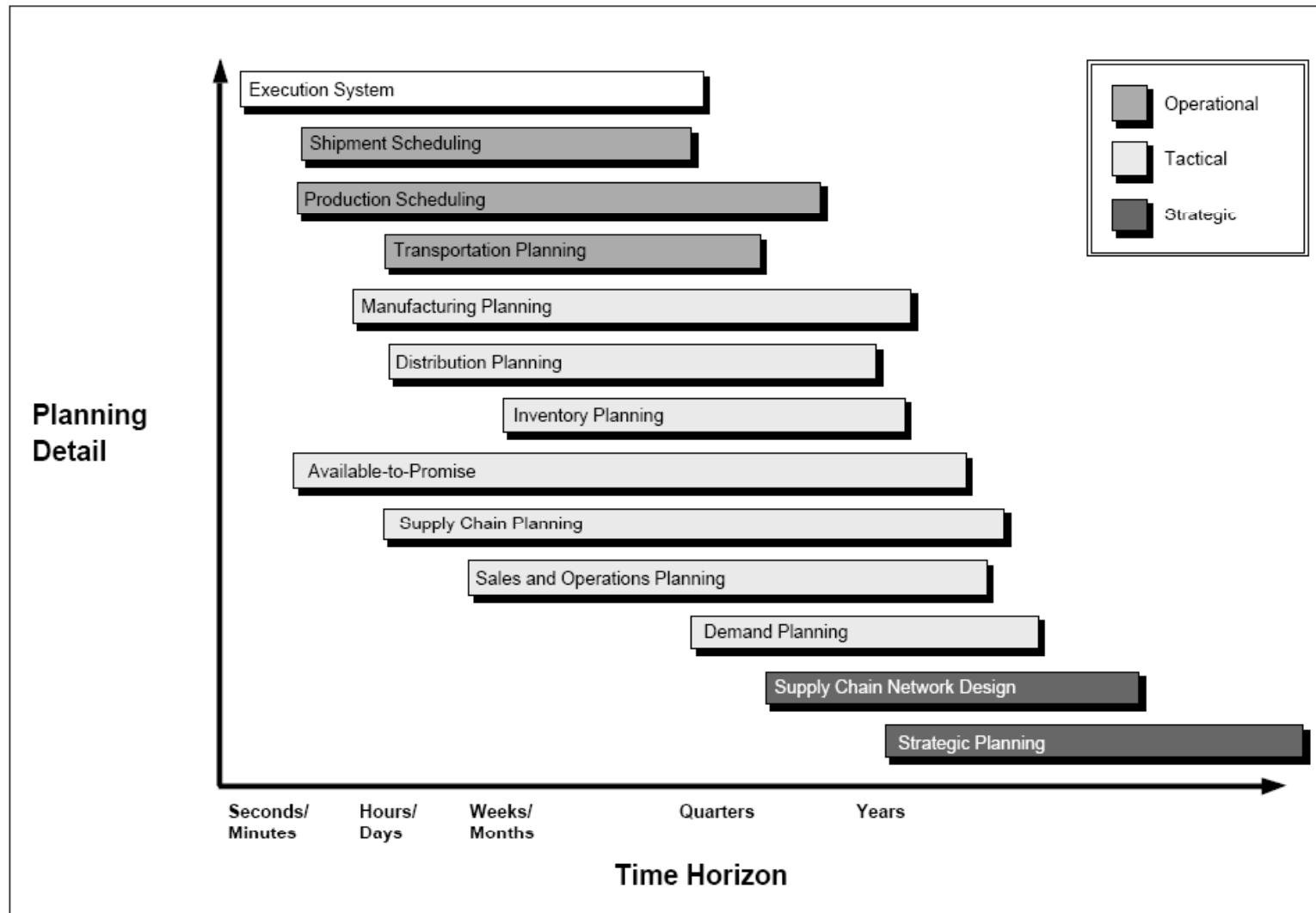
# Supply Chain Design & Planning Philosophies



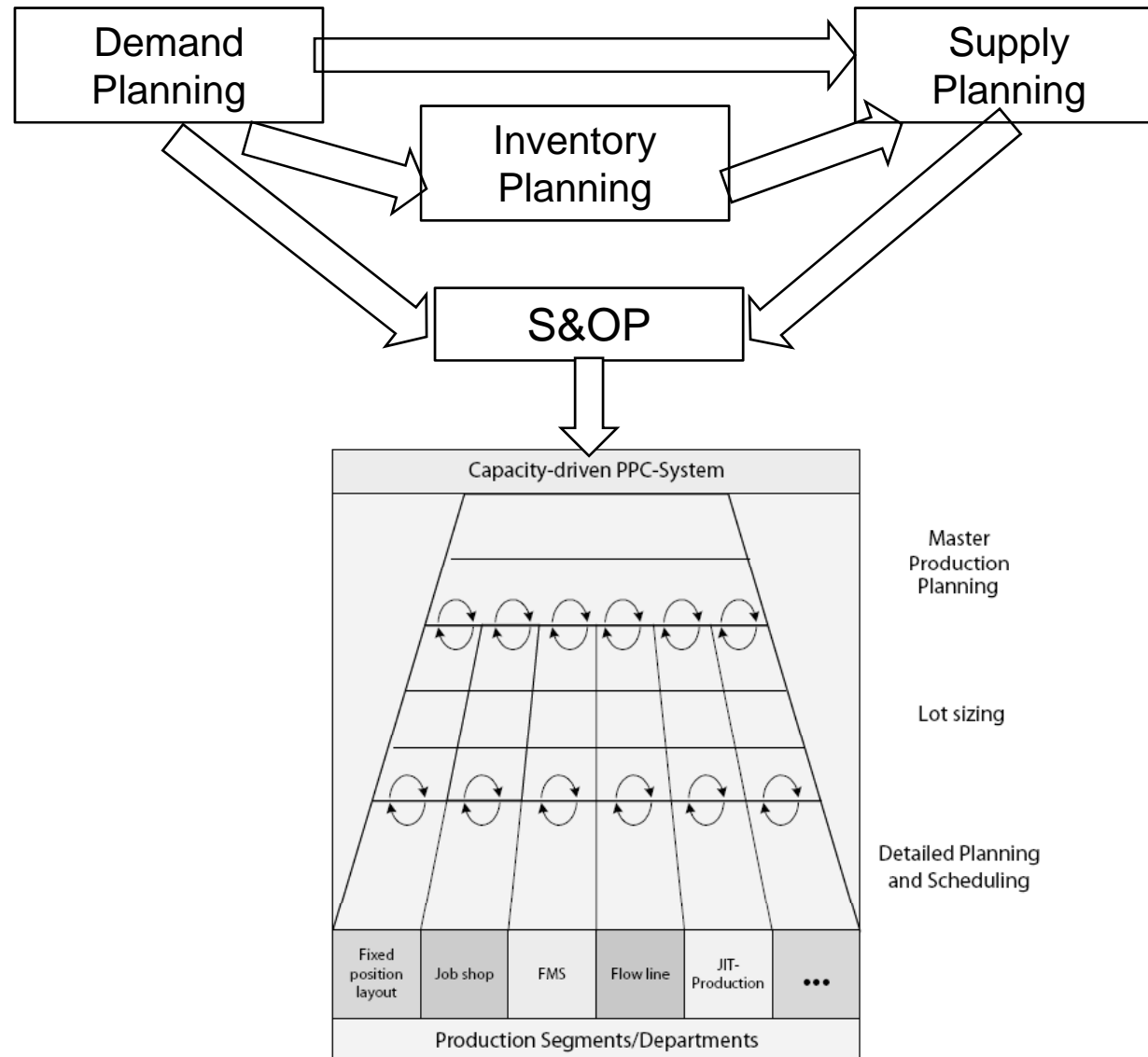
# Integrated Planning System



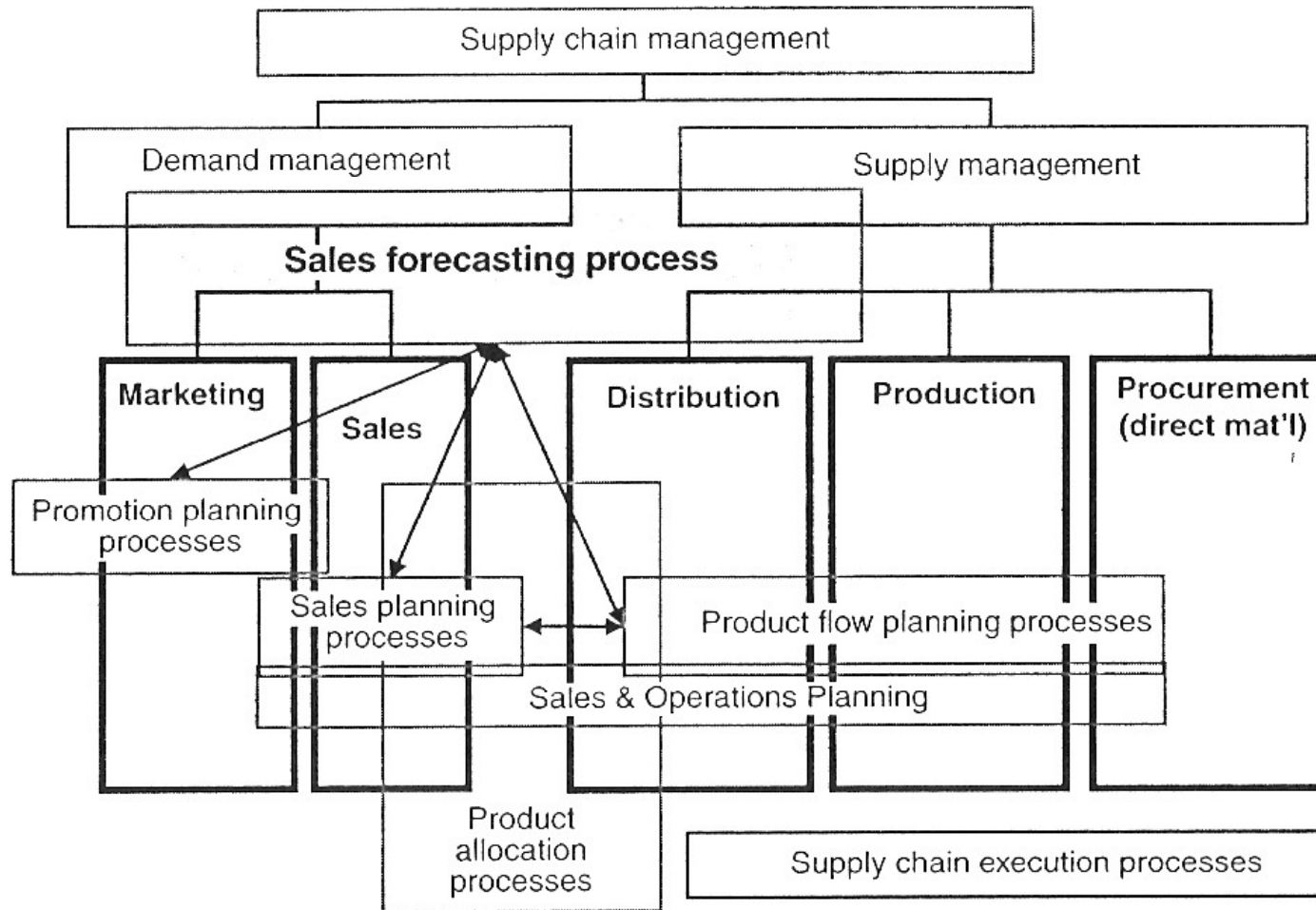
# Planning System



# Planning System



# Planning System



# An Example of Planning Process: Consumer Product



# Improving Product Flow Planning

## Program definition and value

- Define general scope and objectives
- Develop assumptions about business strategy
- Review and document demand/supply strategies and current planning strategies
- Do root cause analysis on perceived issues
- Set general quantitative targets

## Create planning structure

- Define planning sphere
- Analyze opportunities
- Formulate approach

## Develop a prioritized, multi-release program

- Develop more detailed estimates of opportunities and costs
- Design releases/priorities
- Develop budget for each release and ROI
- Gain approval to proceed

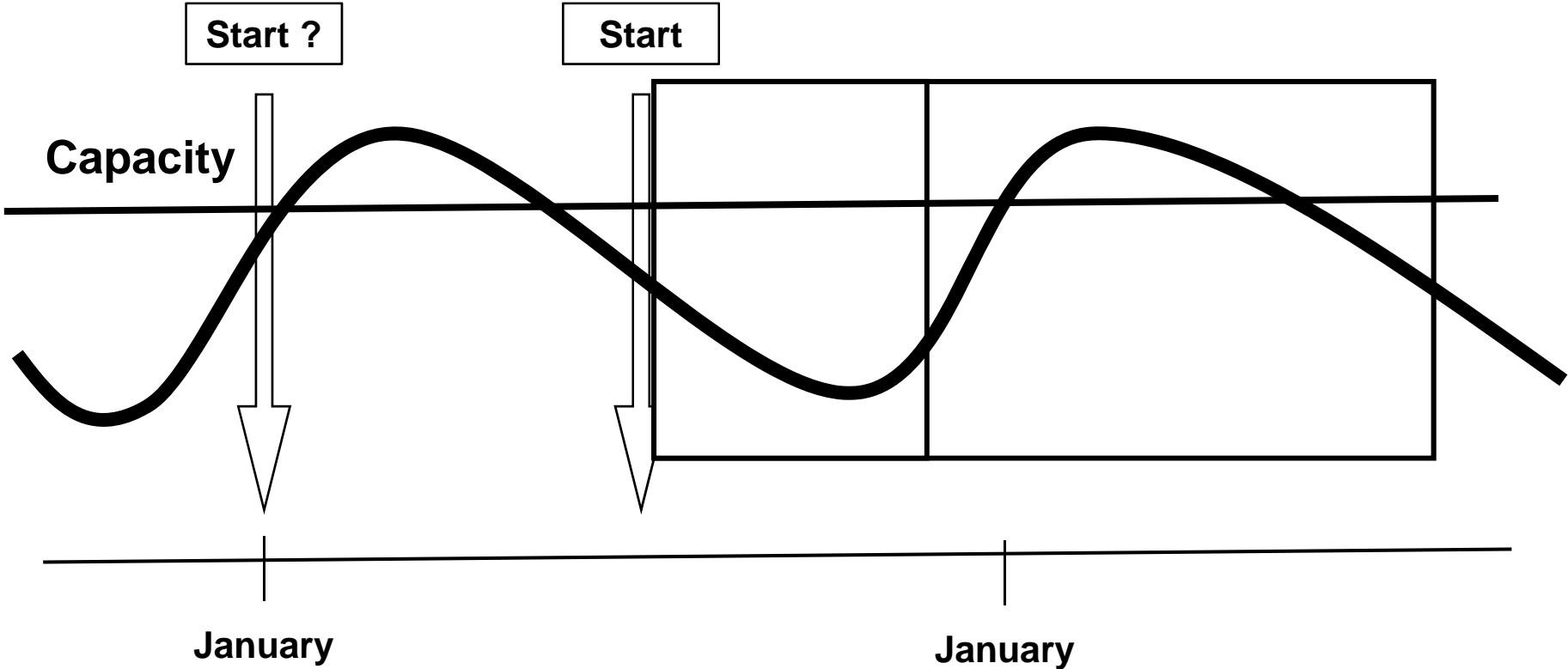
## Design and implement each of the releases

- Design, including software selection if required
- Build, beginning with pilot
- Deploy

## Operate and evolve

- Review of effectiveness
- Identification of problems
- Identification of critical changes and return to strategy re-think

# Needs for Capacity Planning



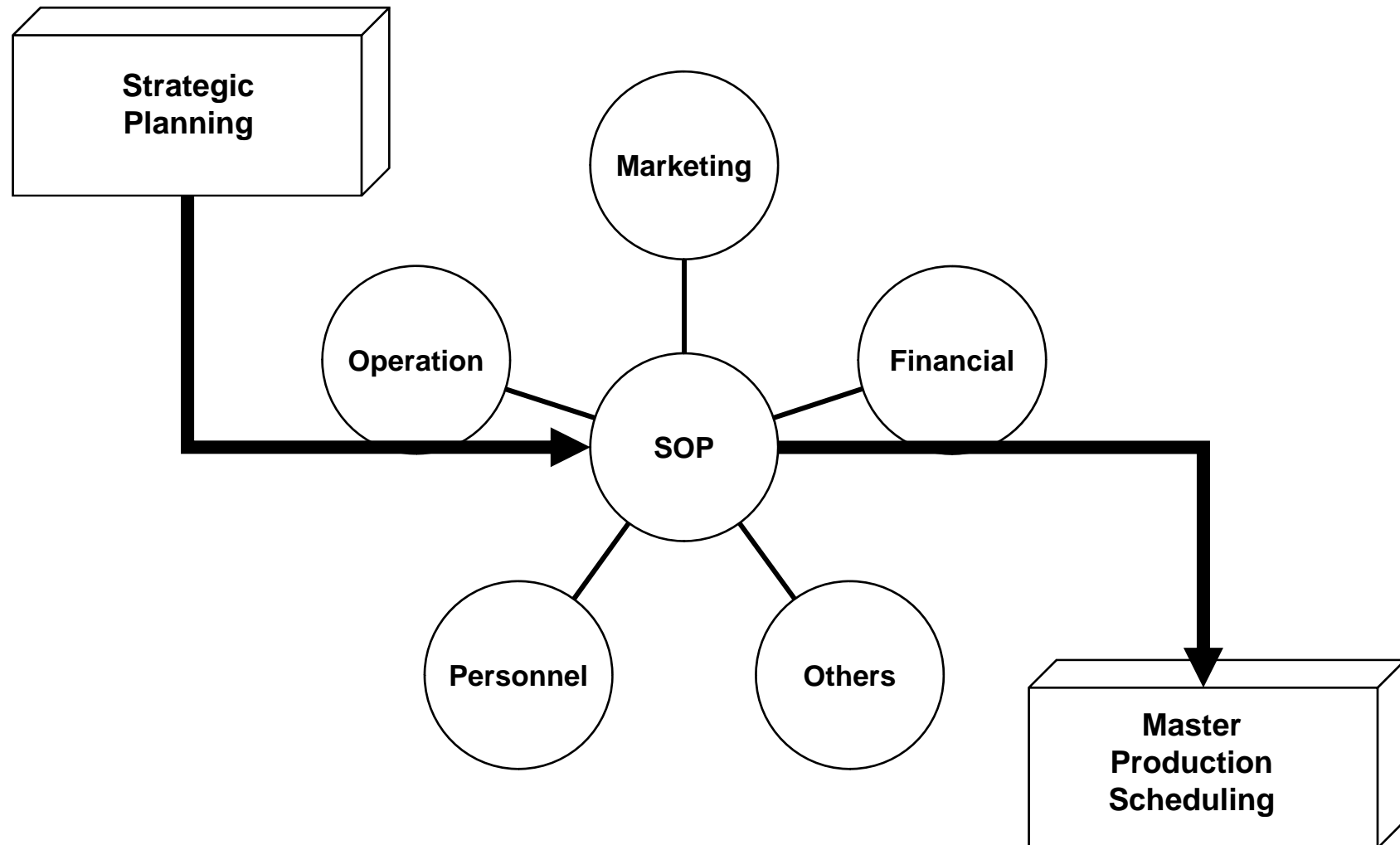
# What is S&OP

- American Production and Inventory Control Society (APICS) defines S&OP as the "function of setting the overall level of manufacturing output (production plan) and other activities to best satisfy the current planned levels of sales (sales plan and/or forecasts), while meeting general business objectives of profitability, productivity, competitive customer lead times, etc., as expressed in the overall business plan. One of its primary purposes is to establish production rates that will achieve management's objective of maintaining, raising, or lowering inventories or backlogs, while usually attempting to keep the workforce relatively stable. It must extend through a planning horizon sufficient to plan the labor, equipment, facilities, material, and finances required to accomplish the production plan. As this plan affects many company functions, it is normally prepared with information from marketing, manufacturing, engineering, finance, materials, etc.

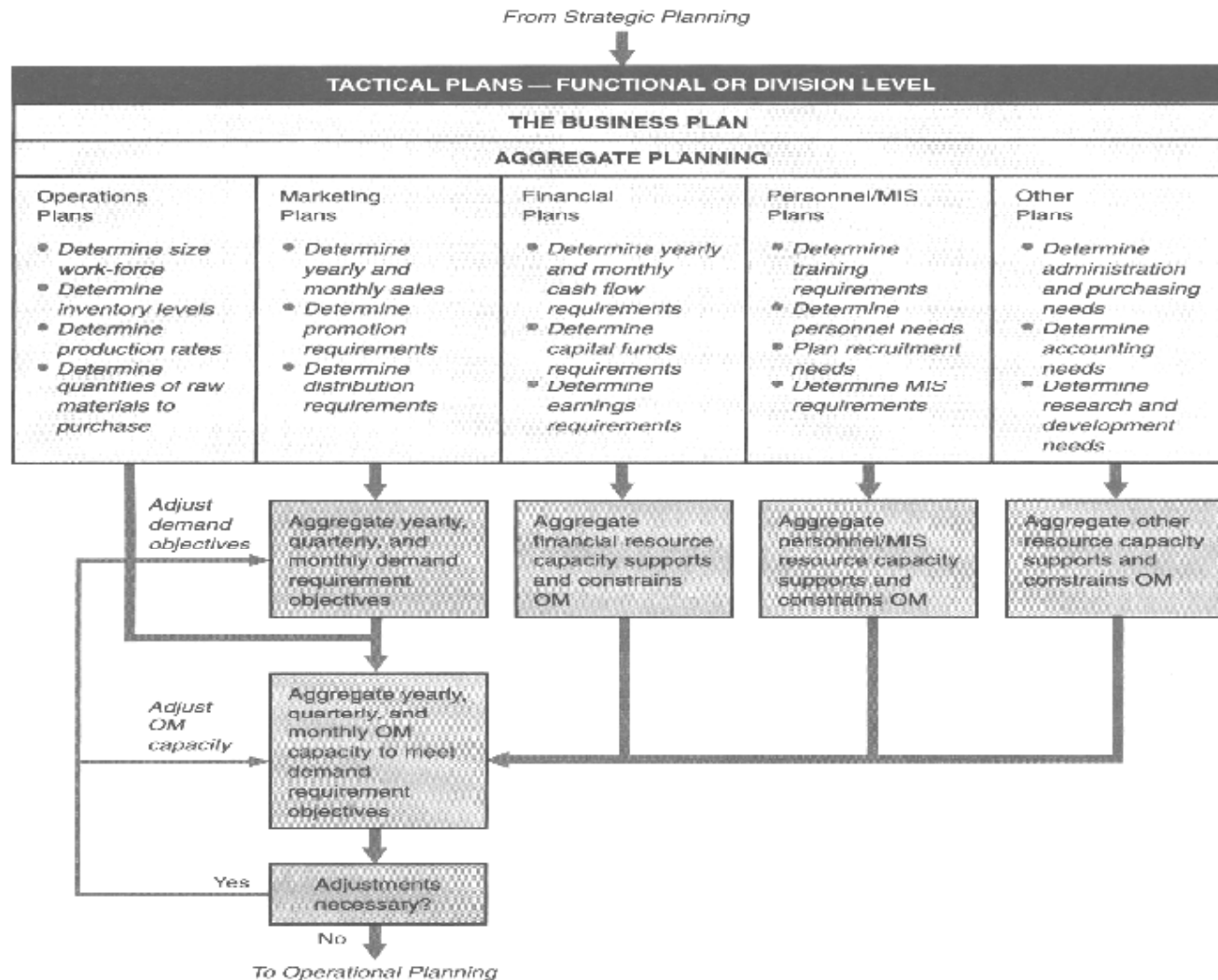
# Sales and Operations Planning (SOP)

- It provides a common plan for the entire company.
- It translates business plan into the language of production.
- It connects strategy and operation.
- It balances demand and supply at the volume level at the product group (family) level (~6-12 groups).

# Sales and Operations Planning (SOP)



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# SOP Meeting

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- Typically held monthly
- Provides an opportunity to control the business and maximize the company's chances for achieving the objectives by

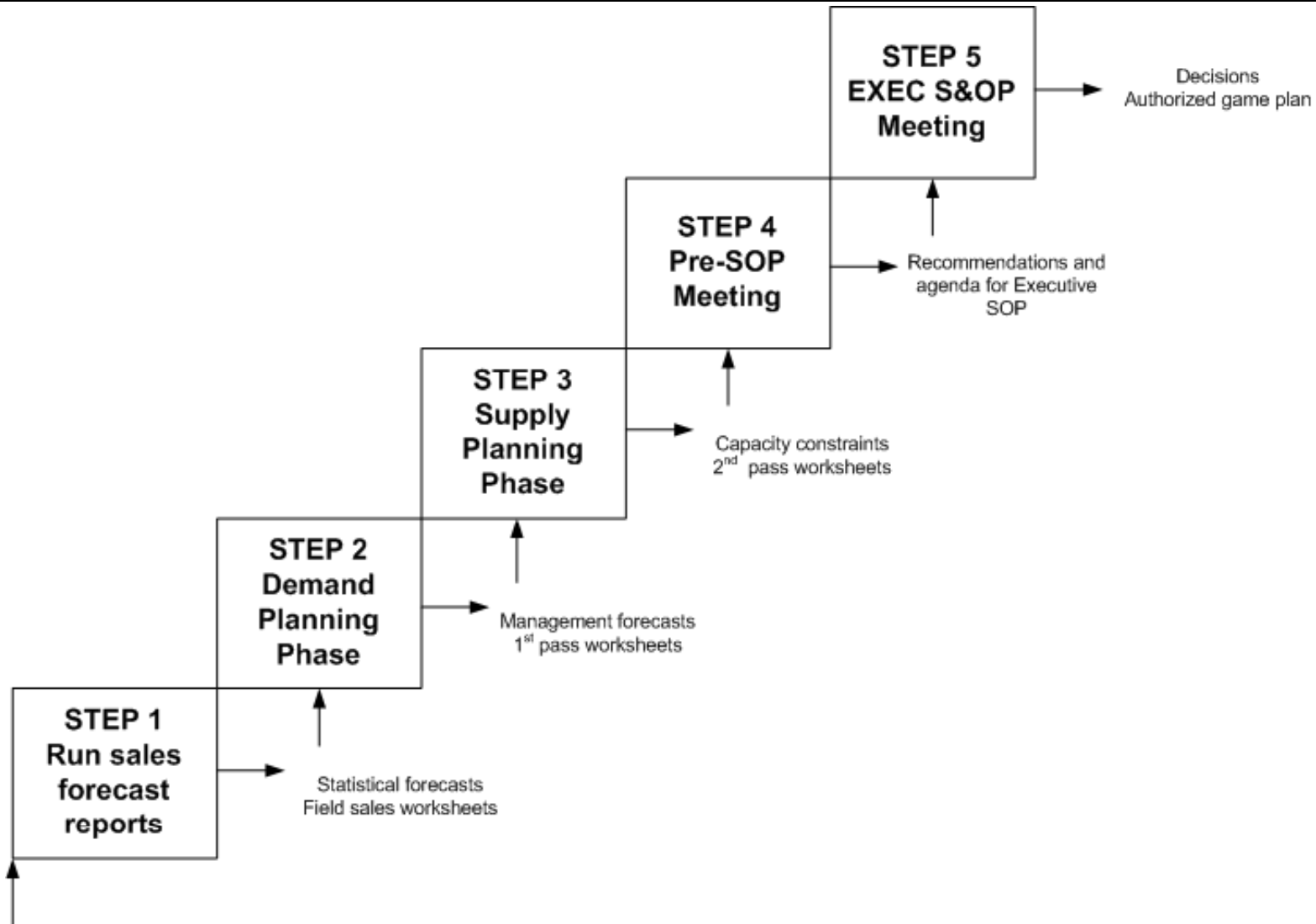
*Anticipate and preparing for the future with contingency plans*

# SOP Meeting

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- Everyone must understand the mechanics of the SOP process.
- Each department must do its premeeting “homework”.
- The company must commit the necessary time and resources.

# Monthly SOP Process



# SOP Monthly Meeting

- Run sales report
- Demand planning
- Supply planning
- Pre-SOP meeting
  - The balance of demand and supply
  - Resolve problems where differences exist
  - Identify areas that cannot be resolved
  - Develop alternative courses of action
  - Set agenda for the Executive SOP meeting
- Executive SOP meeting
  - Make decisions on the sales and operations plans for each product family
  - Authorize spending for changes in production/procurement rate changes
  - Relate the SOP plans to the overall business plan
  - Resolve the problems in the areas where consensus cannot be reached in the Pre-SOP meeting
  - Review customer service and business performance

# SOP Meeting Kit

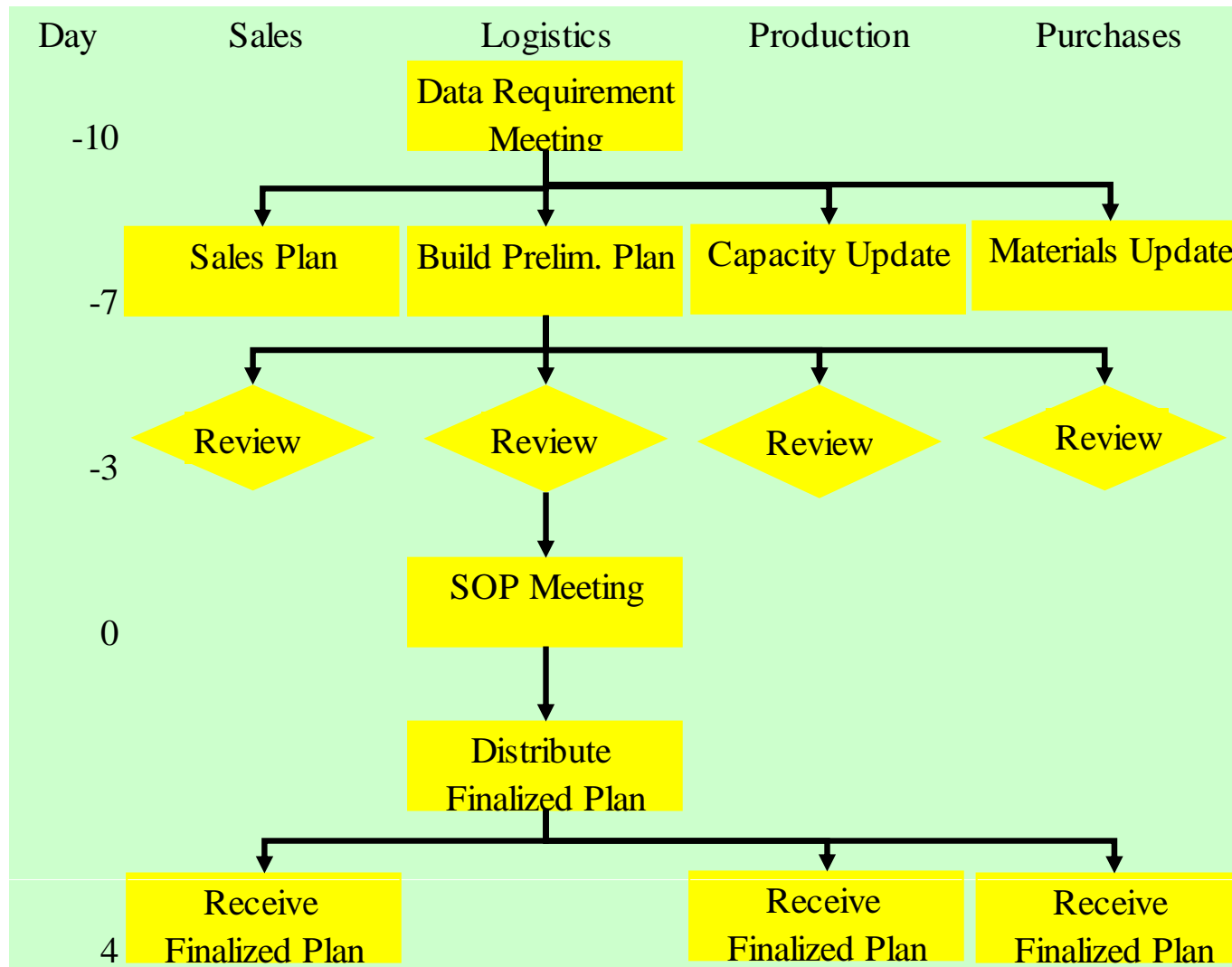
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- All of the premeeting plans developed by various departments
- Analysis of the plan's assumptions and vulnerabilities
- Planning calendar

# Sales & Operations Planning Calendar

Monday	Tuesday	Wednesday	Thursday	Friday
<b>Demand Management Production Planning Inventory Management SOP Meetings</b>			1	2
			12:00 PM-Sales Closing Complete 12:00 PM-Scheduled Trials Due to Master Scheduler 12:00 PM-Inventory Reports Due to Demand Mgr from Plants	12:00 PM-Send On Time Shipments Reports (Email)
5 12:00 PM-Production Plan to Ops	6 2:00 PM-On Time Shipments	7 2:00 PM-Supply Planning Meeting	8 9:00 AM-Final Forecast Due to Ops Analysis	9 12:00 PM-Send On Time Shipments Reports (Email)
12	13 2:00 PM-On Time Shipments	14 2:00 PM-Capacity Call	15 12:00 PM-Send SOP Agenda / Spreadsheets (Email)	16 12:00 PM-Send On Time Shipments Reports (Email)
19	20 1:00 PM-Op & Eng Meeting 2:00 PM-On Time Shipments 5:00 PM-Forecast Feedback to Sales	21 8:00 AM-Op & Eng Meeting 1:00 PM-SOP Meeting	22	23 12:00 PM-Send On Time Shipments Reports (Email) 4:00 PM-Send SOP Meeting Notes (Email)
26 9:00 AM-Sales Forecast Due to Demand Mgr. 5:00 PM-Sales Forecast Due to BUD's	27 2:00 PM-On Time Shipments	28 1:00 PM-Final Forecast Due to Demand Mgr from BUD's 2:00 PM-Capacity Call	29 8:30 AM-Production Planning 1:00 PM-Forecast Due to Master Scheduler	30 12:00 PM-Send On Time Shipments Reports (Email)

# Sales & Operation Planning



# Hierarchical S&OP Planning

Planning Horizons	Process Frequency	Functional Team Members	Process Objectives	Sample Process Inputs	Sample Process Performance Measures
Short-Term <ul style="list-style-type: none"> <li>Weekly buckets for approximately 6 weeks</li> <li>Daily buckets for first week, if required</li> </ul>	Weekly	<ul style="list-style-type: none"> <li>Leader: Demand Planner</li> <li>Team: Demand Planner; SMEs (as required)</li> <li>Issues Resolution: OPG Leader</li> </ul>	<ul style="list-style-type: none"> <li>Monitor progress vs. demand and supply plans (S&amp;OP)</li> <li>Resolve short-term/ interim conflicts</li> </ul>	<ul style="list-style-type: none"> <li>Firm orders</li> <li>Frozen production schedules</li> <li>Current DC inventory</li> <li>Deployment schedules</li> </ul>	<ul style="list-style-type: none"> <li>Order fill rates</li> <li>Extraneous costs</li> </ul>
Medium-Term <ul style="list-style-type: none"> <li>Weekly buckets for 52 weeks</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>Leader: OPG Leader</li> <li>Team: Demand Planner; OPG team</li> <li>Issue Resolution: President</li> </ul>	<ul style="list-style-type: none"> <li>Identify medium-term supply/ demand imbalances</li> <li>Evaluate performance of past short- and medium-term plans</li> <li>Develop and implement corrective actions</li> </ul>	<ul style="list-style-type: none"> <li>Demand forecasts               <ul style="list-style-type: none"> <li>Baseline</li> <li>Promotion</li> <li>NPIs</li> </ul> </li> <li>Supply forecasts and constraints</li> </ul>	<ul style="list-style-type: none"> <li>Customer service</li> <li>Inventory investment</li> <li>Asset utilization</li> <li>Total supply chain costs</li> </ul>
Long-Term <ul style="list-style-type: none"> <li>Monthly buckets for 2 to 3 years</li> </ul>	Quarterly	<ul style="list-style-type: none"> <li>Leader: OPG Leader</li> <li>Team: President, VP Sales, VP Operations, VP Marketing, VP Finance, Strategic Planning Representative</li> <li>Issue Resolution: President</li> </ul>	<ul style="list-style-type: none"> <li>Identify long-term supply/ demand imbalances</li> <li>Evaluate performance of past medium- and long-term plans</li> <li>Develop and implement corrective actions</li> </ul>	<ul style="list-style-type: none"> <li>Long-term demand forecasts and trends</li> <li>Long-term supply forecasts and trends</li> <li>Strategic initiatives</li> <li>Financial objectives and current performance</li> </ul>	<ul style="list-style-type: none"> <li>RONA</li> <li>Market share</li> <li>Contribution</li> <li>Profitability</li> </ul>

# S&OP Maturity Model

## Stage 1 Marginal Process



## Stage 2 Rudimentary Process



## Stage 3 Classic Process



## Stage 4 Ideal Process

### Informal Meetings

- Sporadic scheduling

### Disjointed processes

- Separate, disjoint demand plans
- Supply plans not aligned to demand plans

### Minimal technology-enablement

- Multitude of spreadsheets

### Formal meetings

- Routine schedule
- Spotty attendance and participation

### Interfaced processes

- Demand plans reconciled
- Supply plans aligned to demand plans

### Standalone applications interfaced

- Stand-alone demand planning system
- Standalone multi-facility APS system
- Systems interfaced on a one-way basis

### Formal meetings

- 100% attendance and participation

### Integrated Processes

- Demand and supply plans jointly aligned
- External collaboration with limited number of suppliers and customers

### Applications integrated

- Demand planning packages and supply planning apps. integrated
- External information manually brought into the process

### Event-driven meetings

- Scheduled when someone wants to consider a change or when a supply-demand imbalance is detected

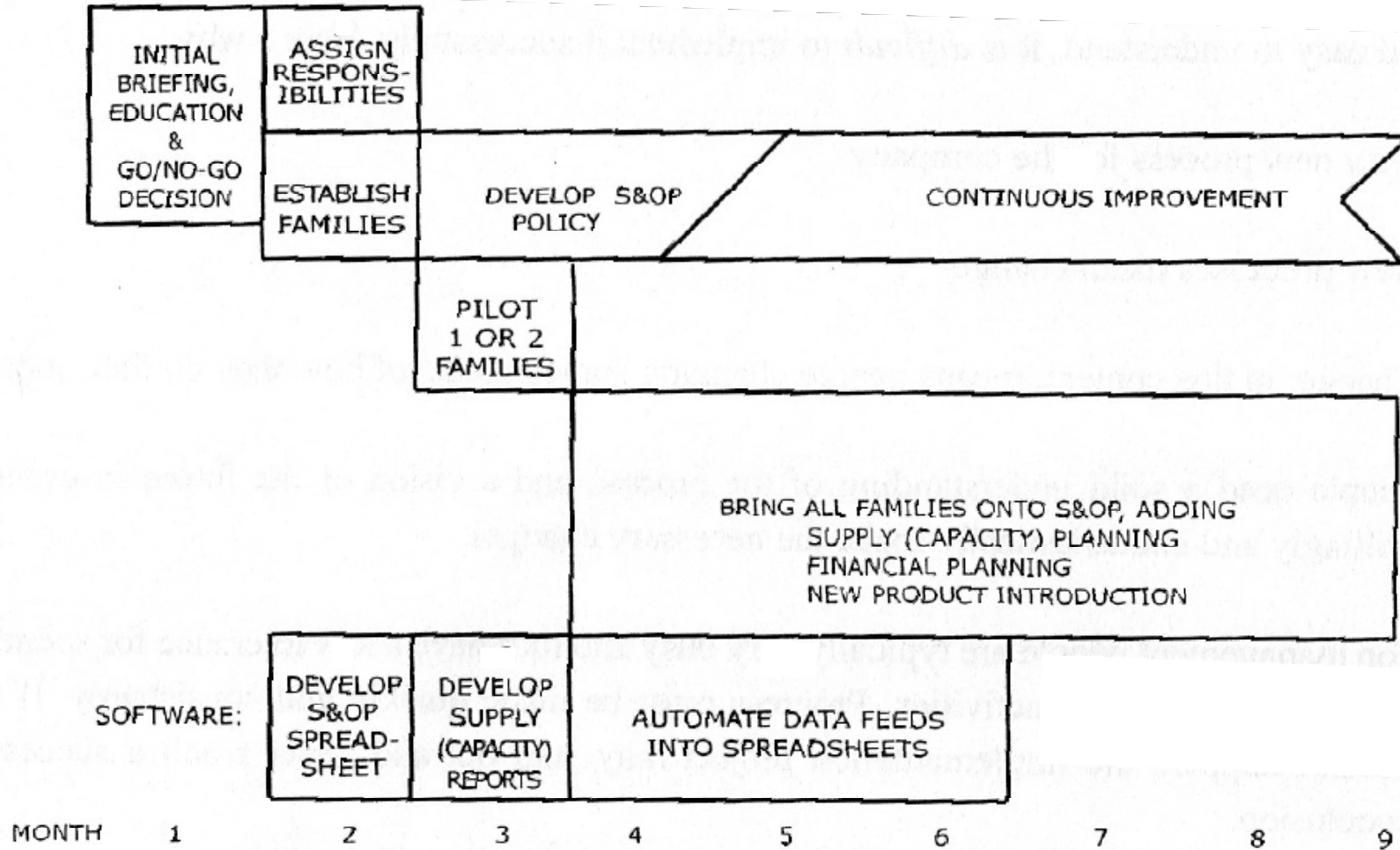
### Extended processes

- Demand and supply plans aligned internally and externally
- External collaboration with most suppliers and customers

### Full set of integrated technologies

- An advanced S&OP workbench
- External-facing collaborative software integrated to internal demand-supply planning systems

# How to Make It Work



# S&OP Practices

## Performance-ranked S&OP practices.

<i>To what extent do the following statements describe your site's S&amp;OP process?</i>		Customer order cycle time	Perfect order performance	Cash-to-cash cycle time	Inventory turn rate
		< = 8 days	> = 96%	< = 13 days	> = 27
Formal meetings with sales, marketing, and supply chain operations	No extent	16.7	5.6	18.2	10
	Little extent	11.1	5.6	0	0
	Some extent	27.8	38.9	54.5	50
	Significant extent	44.4	50	27.3	40
Demand and supply plans are formally aligned and agreed upon across business functions (consensus-based forecasting)	No extent	13.9	5.6	20	20
	Little extent	30.6	33.3	10	0
	Some extent	22.2	27.8	30	20
	Significant extent	33.3	33.3	40	60
External demand collaboration with customers	No extent	22.2	27.8	22.2	11.1
	Little extent	33.3	33.3	11.1	22.2
	Some extent	27.8	22.2	44.4	33.3
	Significant extent	16.7	16.7	22.2	33.3
External supply planning collaboration with suppliers	No extent	16.7	27.8	9.1	0
	Little extent	25	5.6	45.5	20
	Some extent	36.1	38.9	27.3	40
	Significant extent	22.2	27.8	18.2	40
Supported by integrated demand and supply planning applications	No extent	22.2	27.8	27.3	10
	Little extent	16.7	11.1	9.1	0
	Some extent	38.9	27.8	36.4	40
	Significant extent	22.3	33.3	27.3	50

Source: IBM Institute for Business Value.