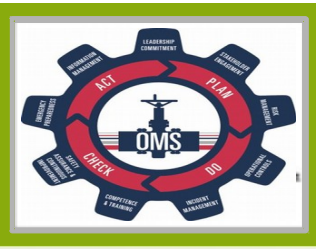


6 OPERATIONS PLANNING

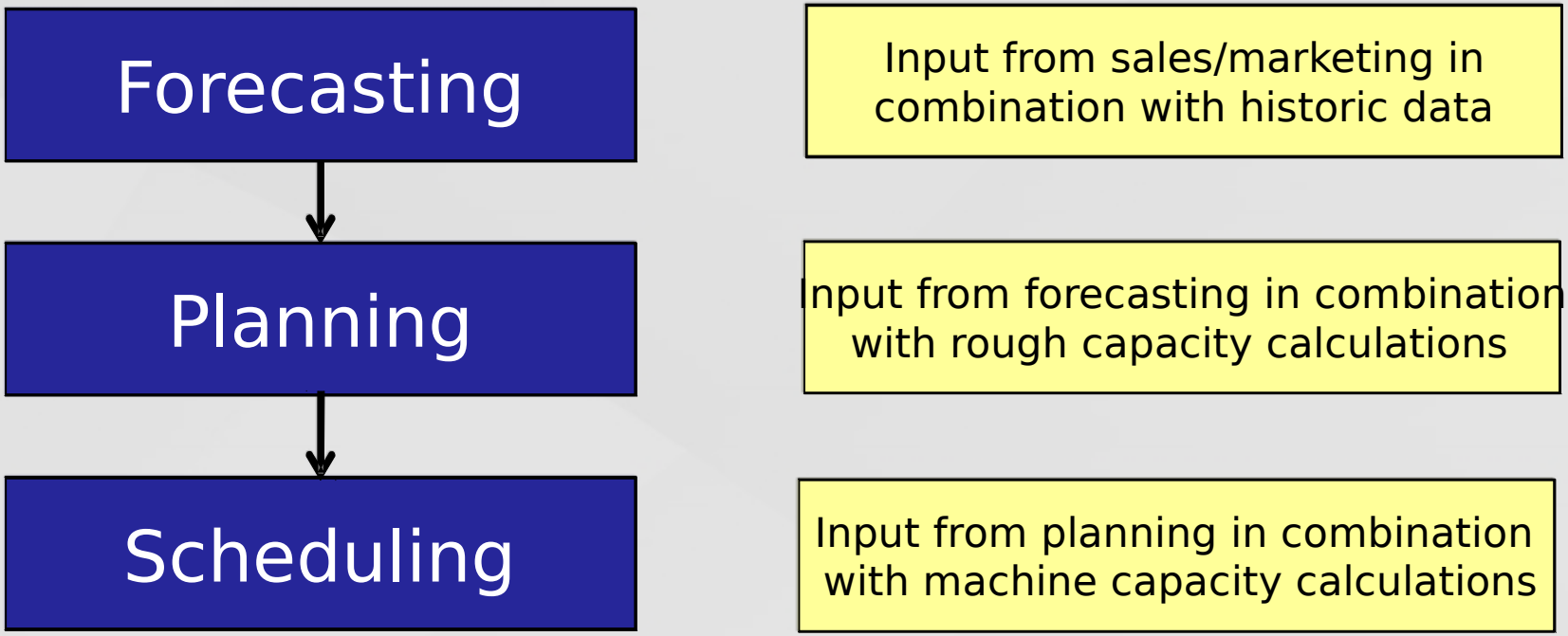
OPERATIONS PLANNING
Introduction

- What levels of planning do you know?
- How can an organisation control their stock levels?
- How can an organisation determine the re-order point?

OPERATIONS PLANNING
Planning hierarchy

OPM basics

- Operations planning hierarchy:



Source: own compilation

OPERATIONS PLANNING
Strategic role of forecasting

- **Forecasting** is making a prediction of how much product will be sold in the future.

- A forecast is the basis for most important planning decisions like:
  - Scheduling
  - Inventory
  - Production
  - Workforce
  - Purchasing
  - Distribution

OPERATIONS PLANNING
Strategic role of forecasting

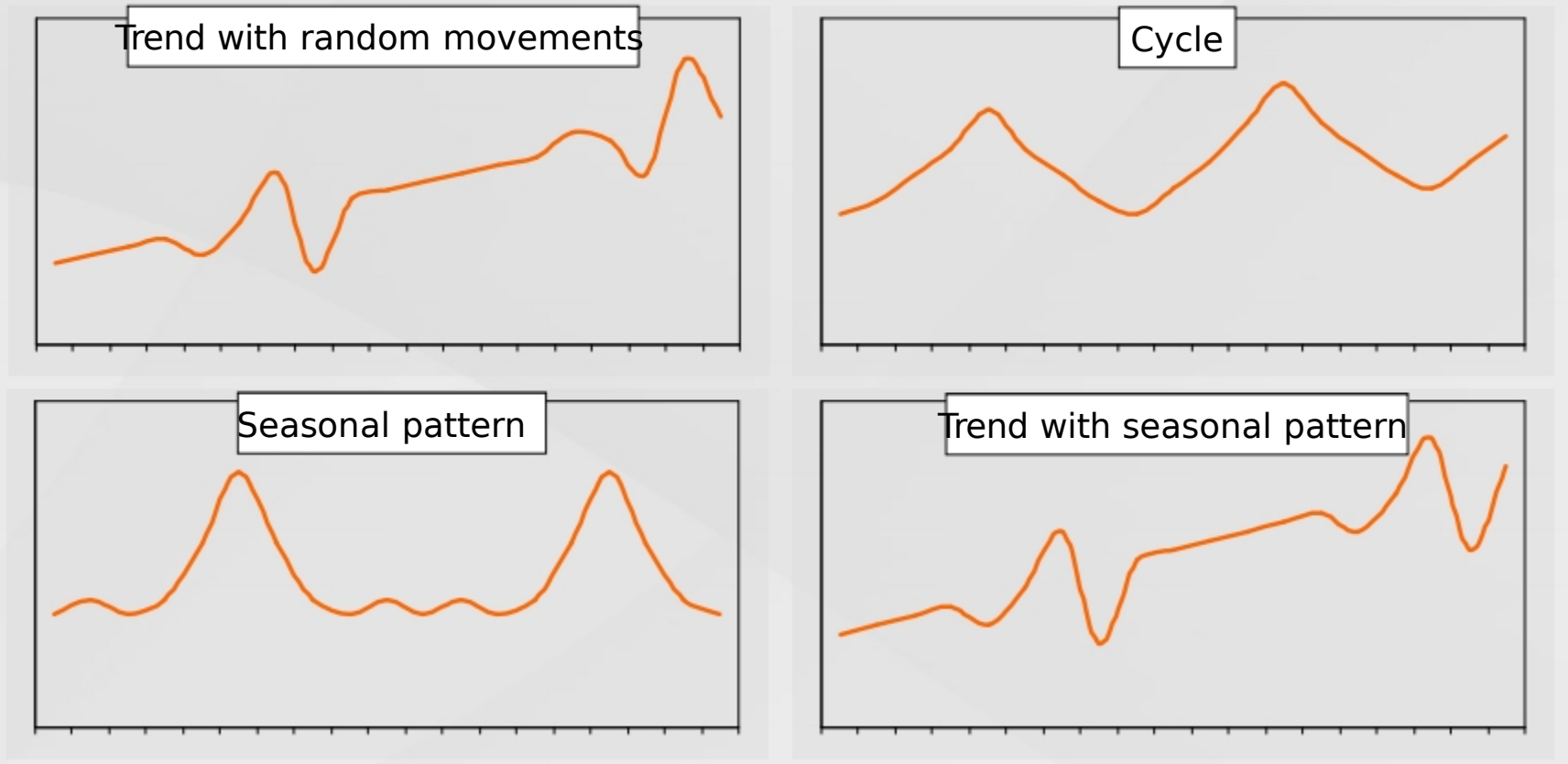
- **Forecast methods** management can use:
  - **Qualitative forecast methods** are subjective, like: judgement, opinion or experience from past.
  - **Quantitative forecast methods** are based on mathematics, like: time series and regression.

- A **long-range forecast** is usually for a period longer than 2 years.

- A **short to mid range forecast** is typically for daily, weekly, or monthly sales, up to 2 years.

OPERATIONS PLANNING
Components of forecasting

Forms of forecast movements



Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS PLANNING
Components of forecasting

- Basic types of forecasting methods are:
  - Time series;
  - Regression methods;
  - Qualitative methods.

- **Time series** methods are statistical techniques that use historical demand data to predict future demand.
- **Regression (or qualitative) methods** attempt to develop a mathematical relationship between demand and factors that cause it to behave the way it does.

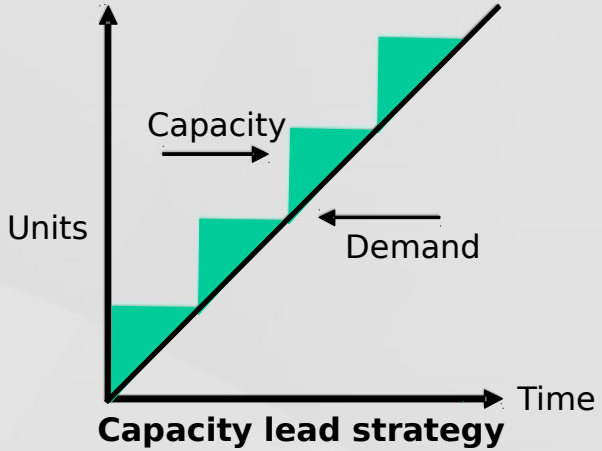
OPERATIONS PLANNING
Capacity planning

- **Capacity planning** is a long term strategic decision that establishes the overall level of productive resources for an organisation.

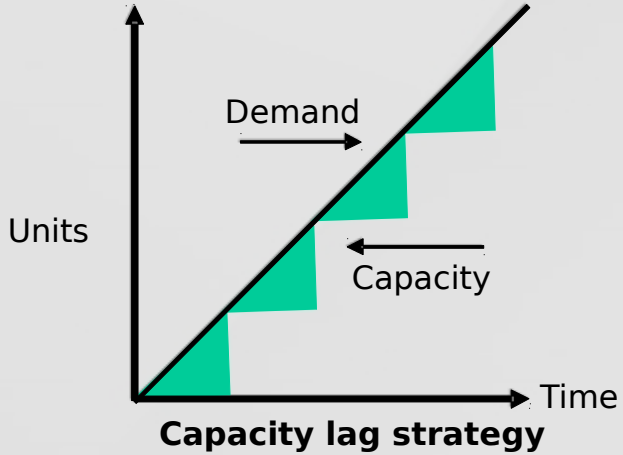
- **Capacity expansion strategies** , as demand grows the following strategies can be used:
  - Capacity lead strategy
  - Capacity lag strategy
  - Average capacity strategy

OPERATIONS PLANNING
Capacity planning

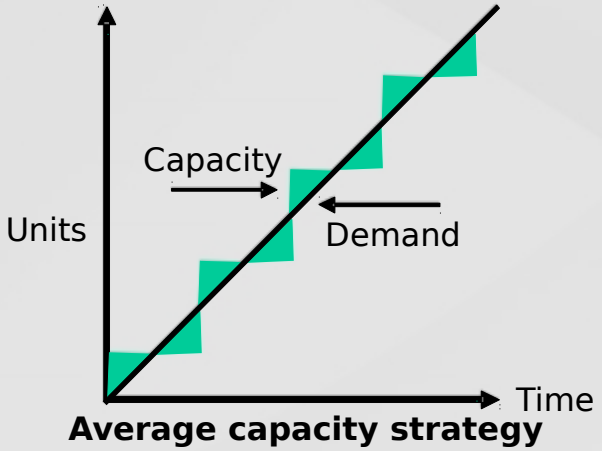
OPM basics



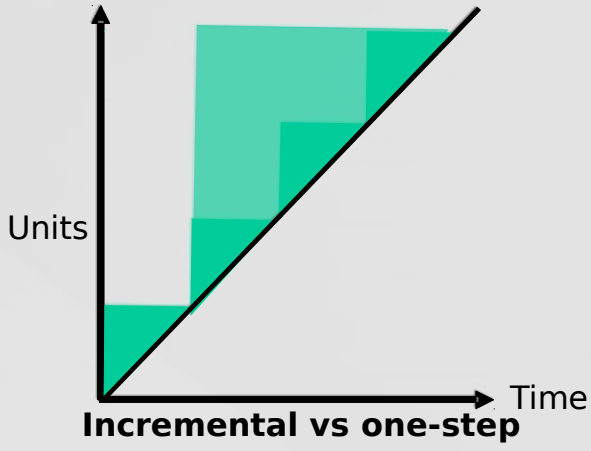
Capacity lead strategy



Capacity lag strategy



Average capacity strategy

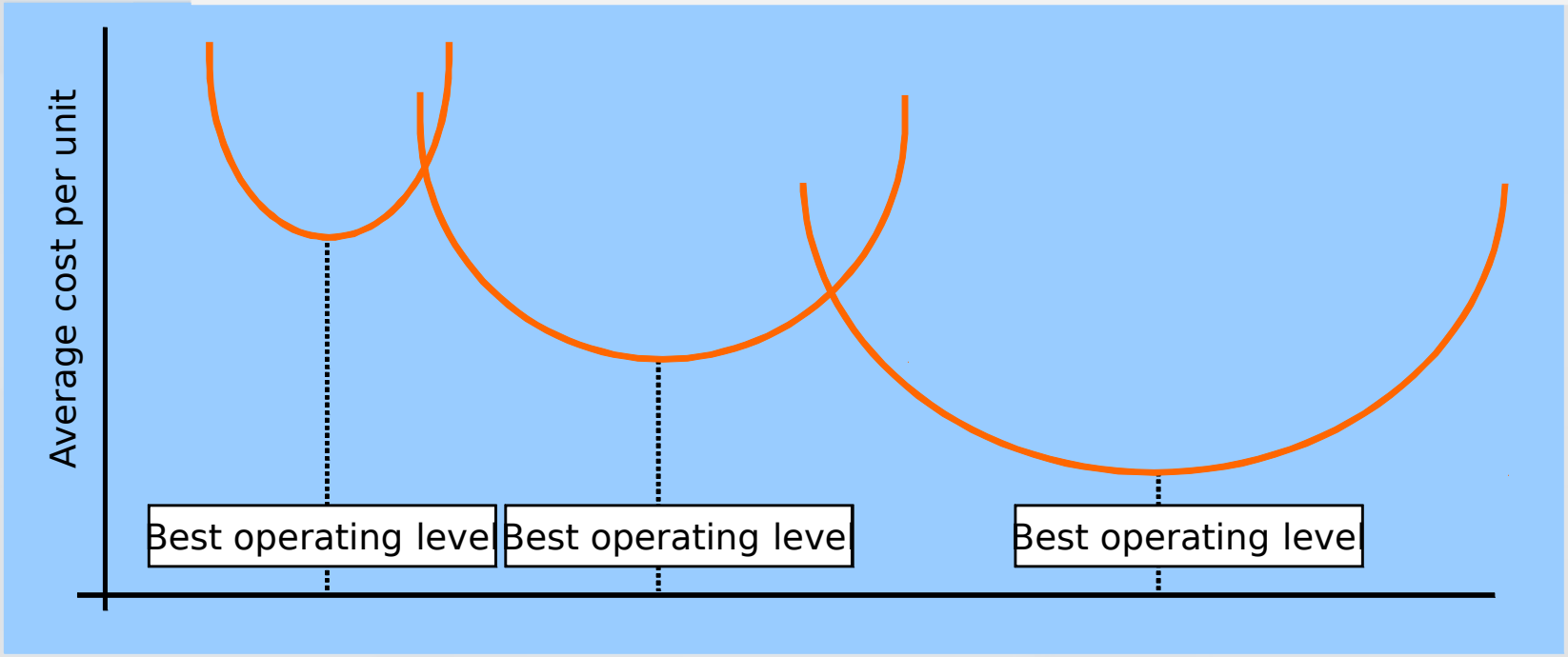


Incremental vs one-step

OPERATIONS PLANNING
Capacity planning

OPM basics

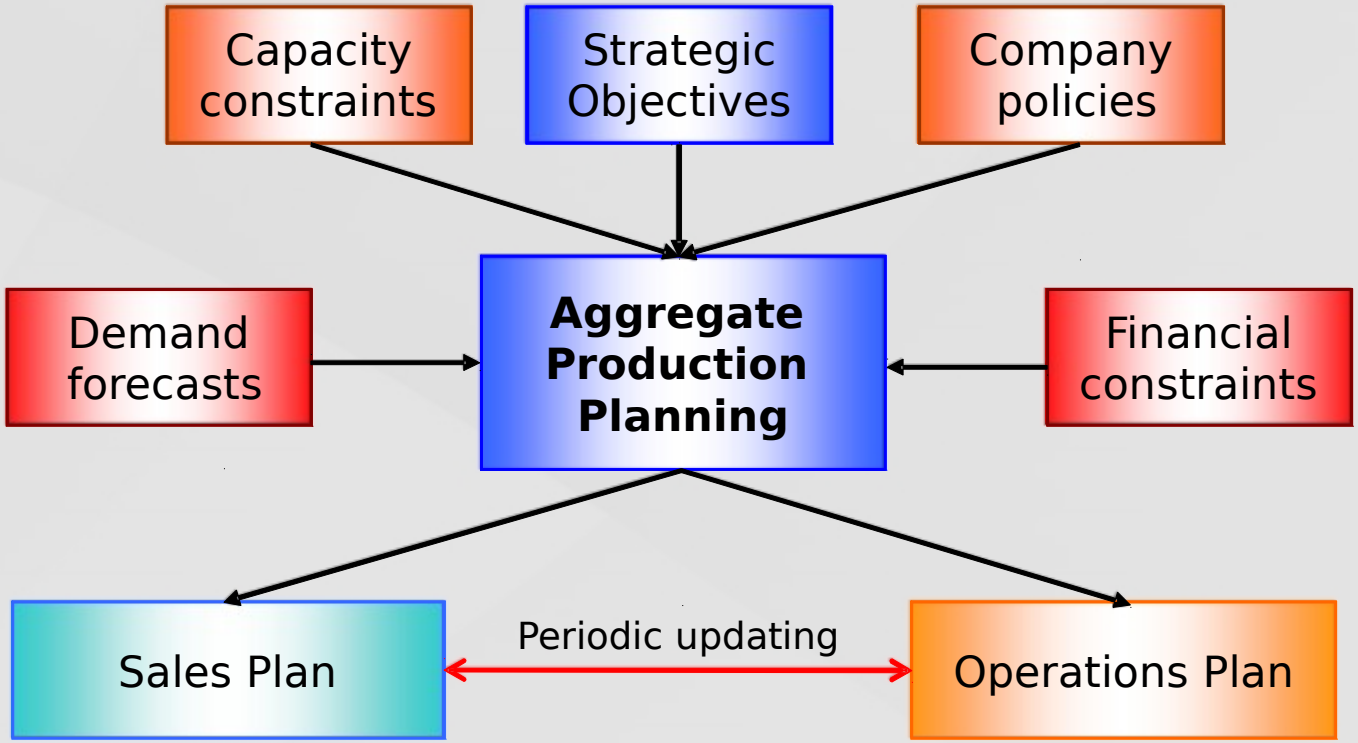
- The best operating level is the percent of capacity utilisation that minimises the unit costs.



Source: own compilation

OPERATIONS PLANNING
Aggregate production planning

Inputs and outputs from aggregate production planning

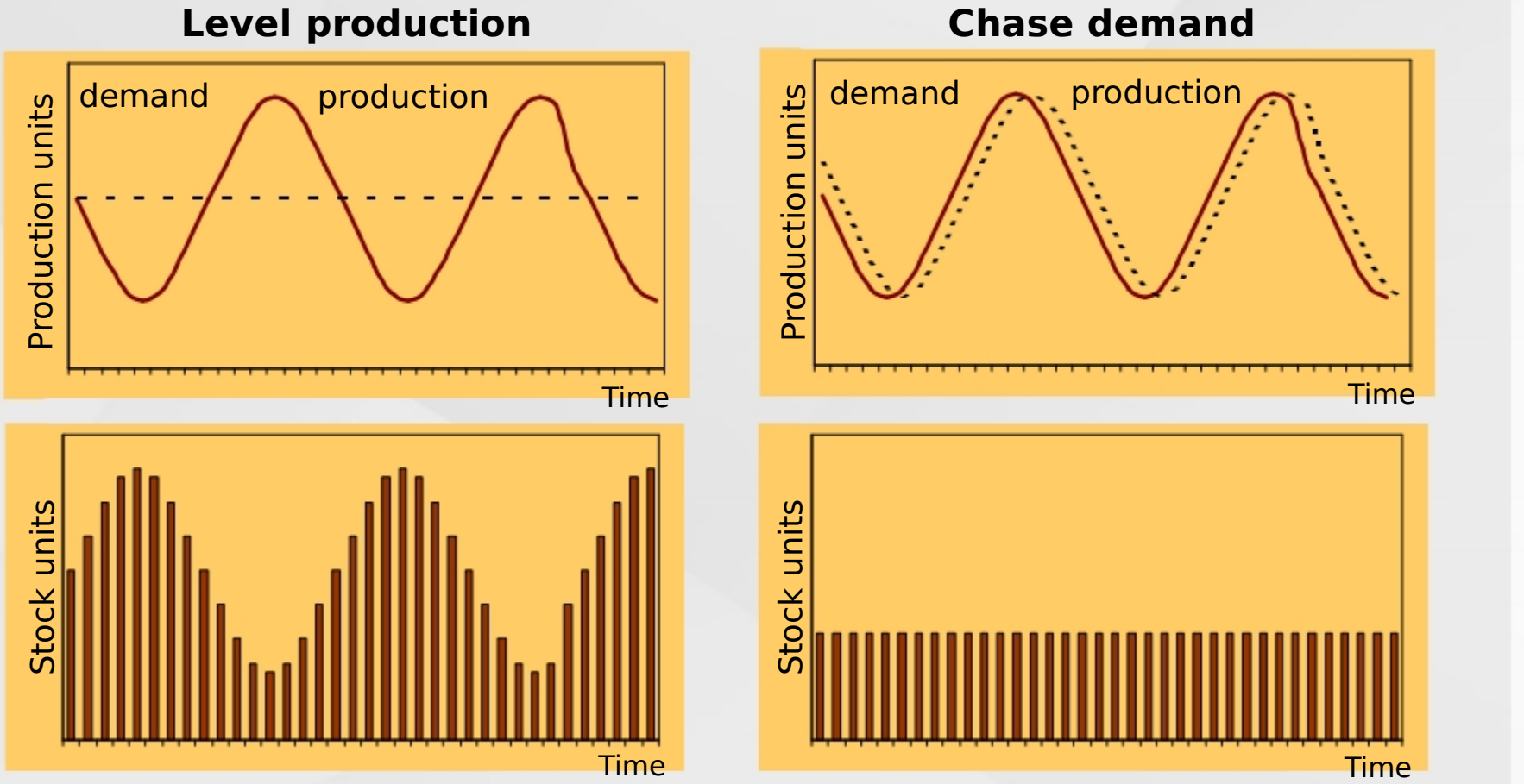


Source: Russell & Taylor, 2003

OPERATIONS PLANNING
Adjusting capacity to demand

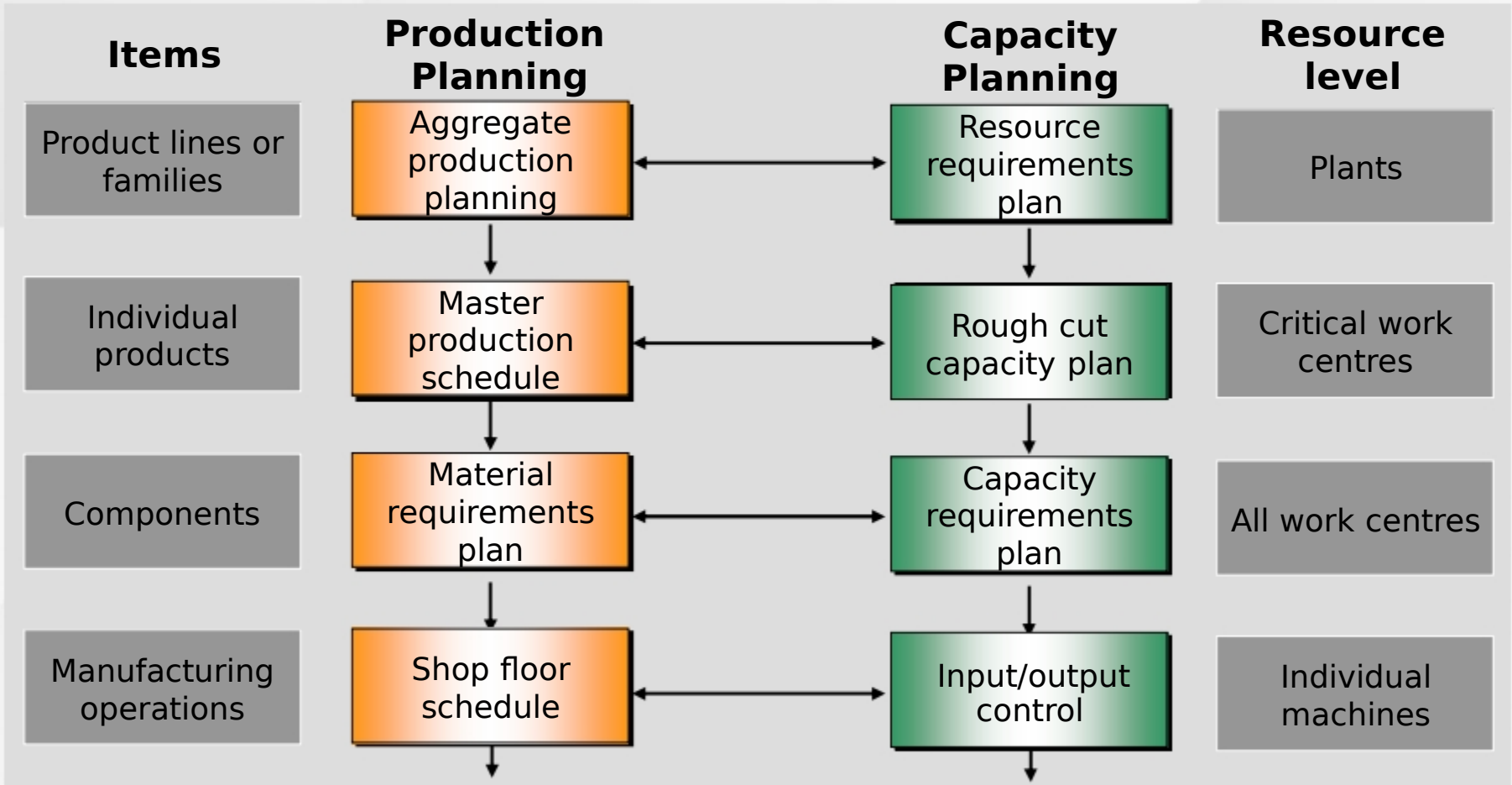
- When demand fluctuates (e.g. seasonal demand), demand patterns can be met:
  - Producing at a constant rate, using inventory to absorb demand;
  - Hiring and firing workers to match demand;
  - Maintaining resources for high level demand;
  - Increasing or decreasing working hours (overtime and undertime;
  - Subcontracting work to other firms;
  - Using part-time workers;
  - Providing the service or product at a later period.

OPERATIONS PLANNING
Adjusting capacity to demand



Source: Russell & Taylor, 2003

OPERATIONS PLANNING
Hierarchical planning

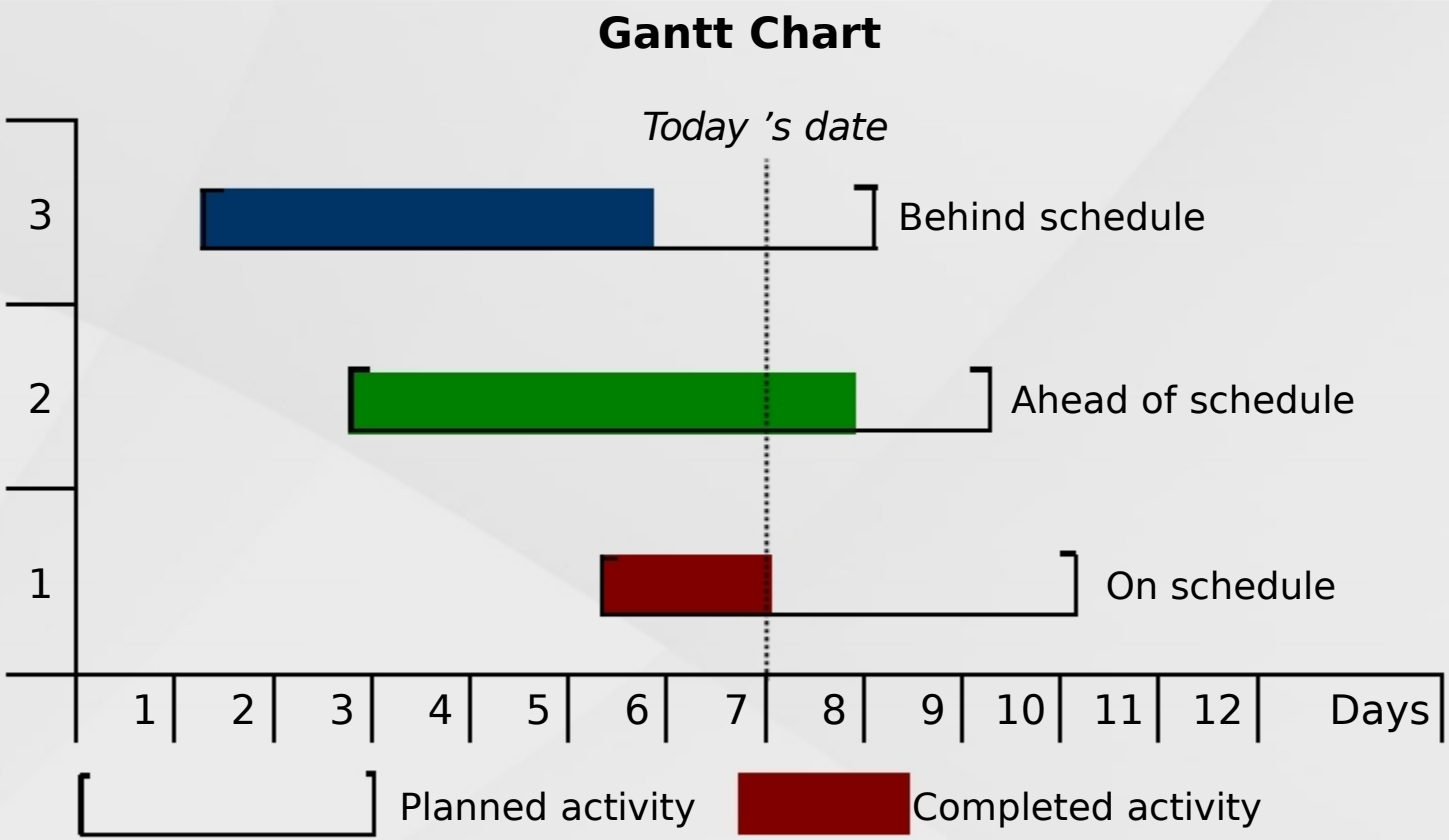


Source: Russell & Taylor, 4th Edition, 2003

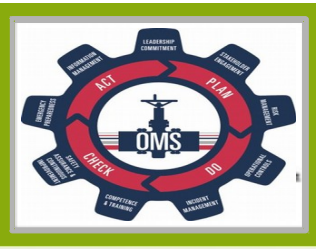
OPERATIONS PLANNING
Sequencing

- Guidelines for selecting sequencing rules:
  - **SPT** (shortest processing time) is most useful when the shop is highly congested
  - Use **SLACK** (slack) for periods of normal activity
  - Use **DDATE** (due date) when only small tardiness values can be tolerated
  - Use **LPT** (longest processing time) if subcontracting is anticipated
  - Use **FCFS** (first come first served) when operating at low-capacity levels
  - Do not use **SPT** to sequence jobs that have to be assembled with other jobs at a later date

OPERATIONS PLANNING
Monitoring



Source: Russell & Taylor, 2009, p. 735



7 ENTERPRISE RESOURCE PLANNING (ERP)

ENTERPRICE RESOURCE PLANNING
Introduction

- What is Enterprise Resource Planning (ERP)?
- What advantages and disadvantages of ERP do you know?
- If you have many orders on the shop floor which orders would you give priority?

ENTERPRICE RESOURCE PLANNING
ERP and MRP

- **Material requirement planning** (MRP) is a computerized inventory control and production planning.

1970	1980	1990	Now
MRP	MRP II	ERP	ERP II
Production control Inventory control	+ Capacity planning Shop floor control	+ Linking all internal business transactions	+ Linking all external business transactions

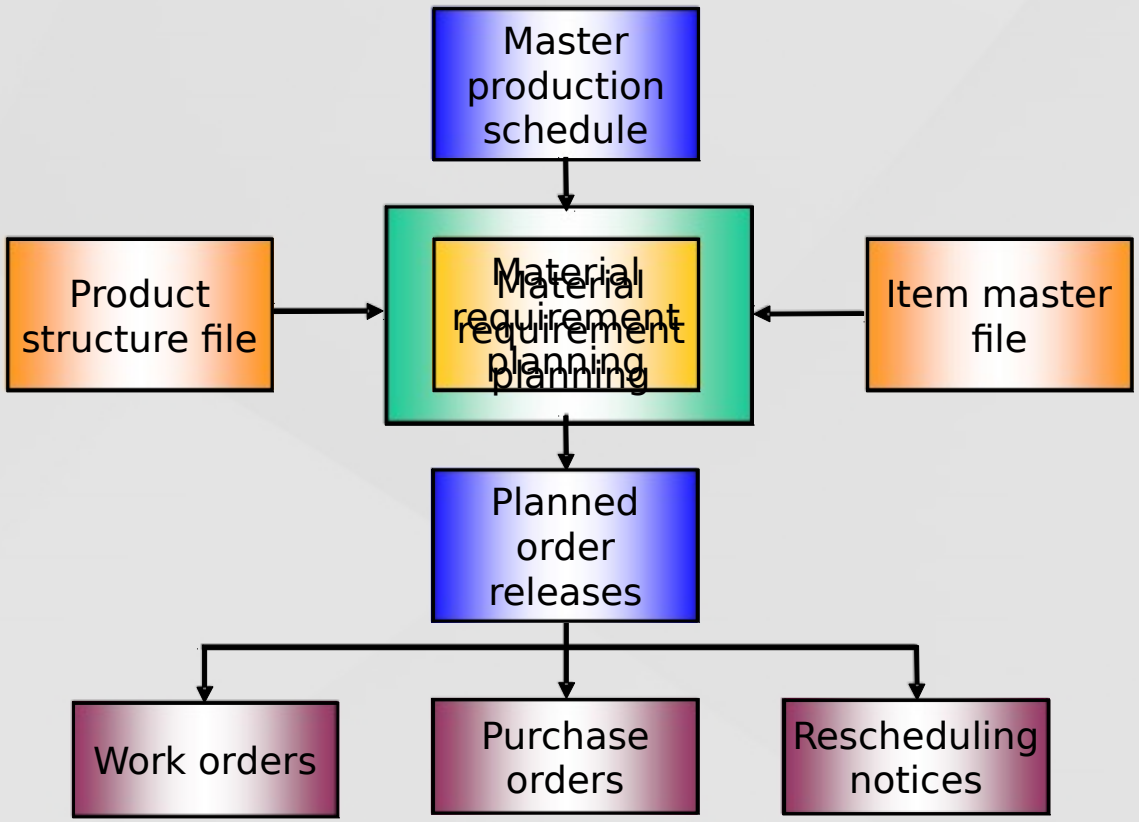
Source: Own compilation

ENTERPRICE RESOURCE PLANNING
Material requirements planning

- **Master Requirements planning** (MRP) translates a master schedule for end items into time-phased requirements for subassemblies, components and raw materials.

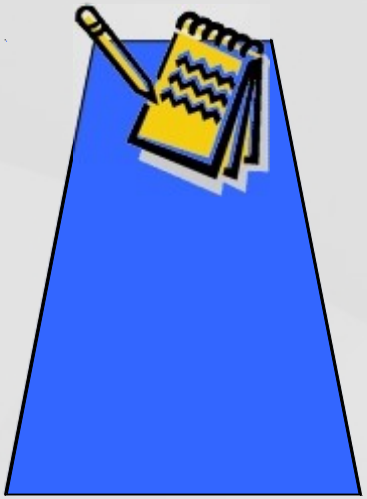
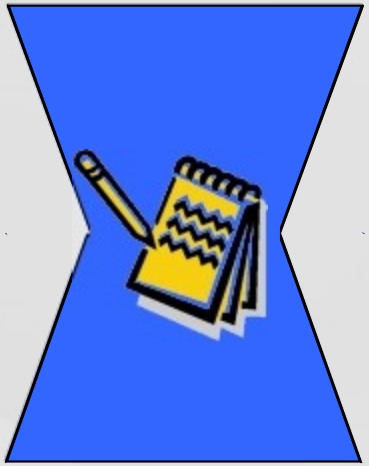
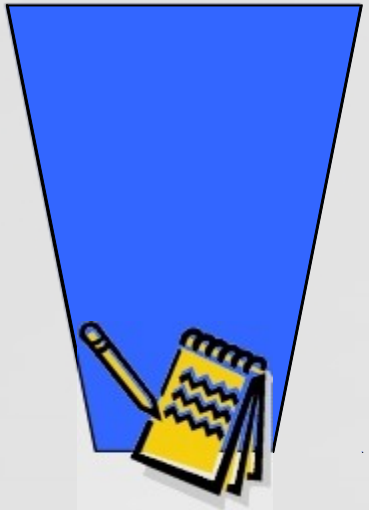
- MRP is useful for *dependant* and *discrete* demand items, complex products, job shop production, and assemble-to-order environments.

ENTERPRICE RESOURCE PLANNING
Material requirements planning



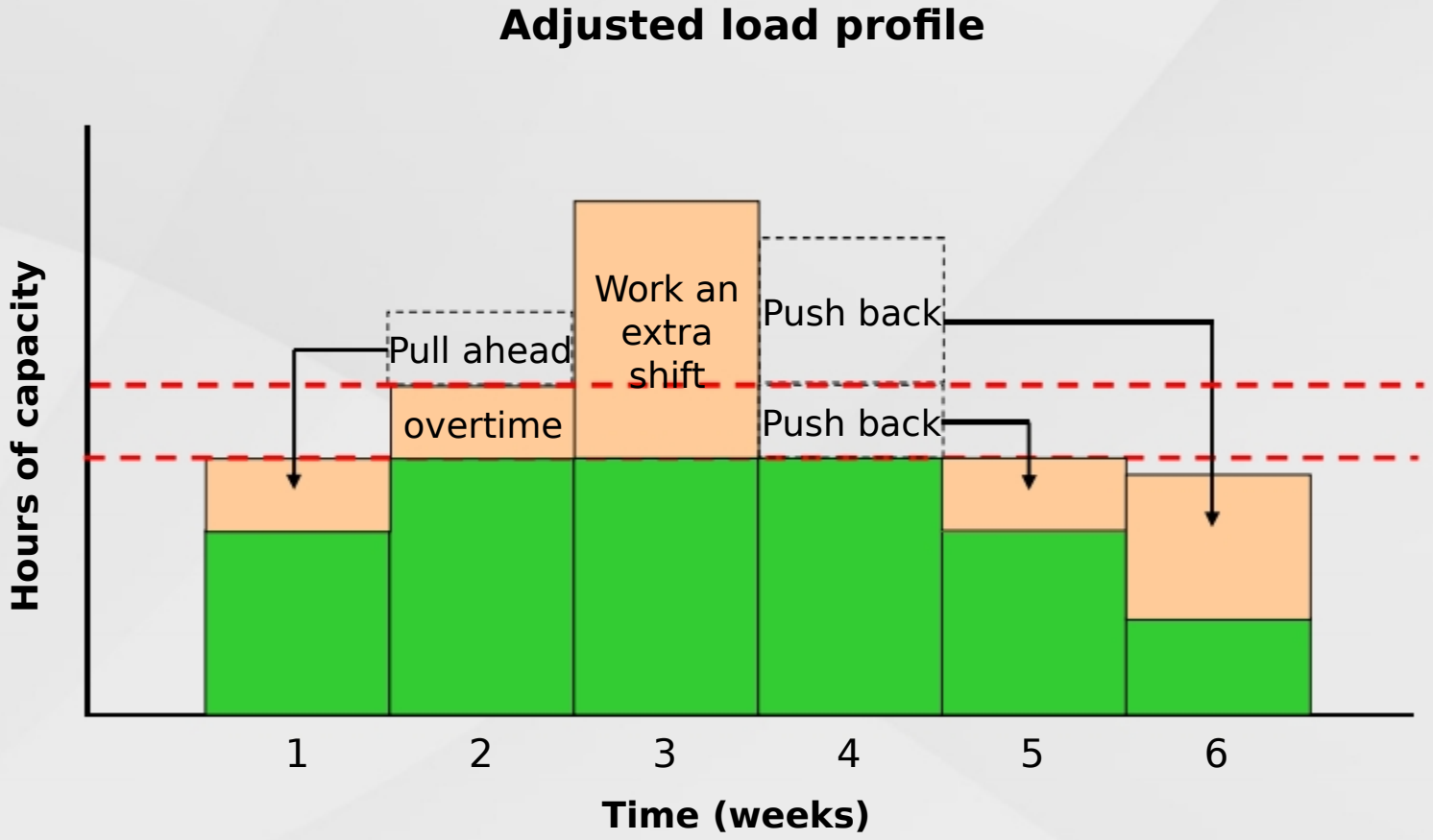
Source: Russell & Taylor, 2009, p. 650

ENTERPRICE RESOURCE PLANNING
Levels of scheduling

Make-to-stock	Assemble-to-order	Make-to-order
		
Master schedule finished products	Master schedule major subassemblies or modules	Master schedule components or materials

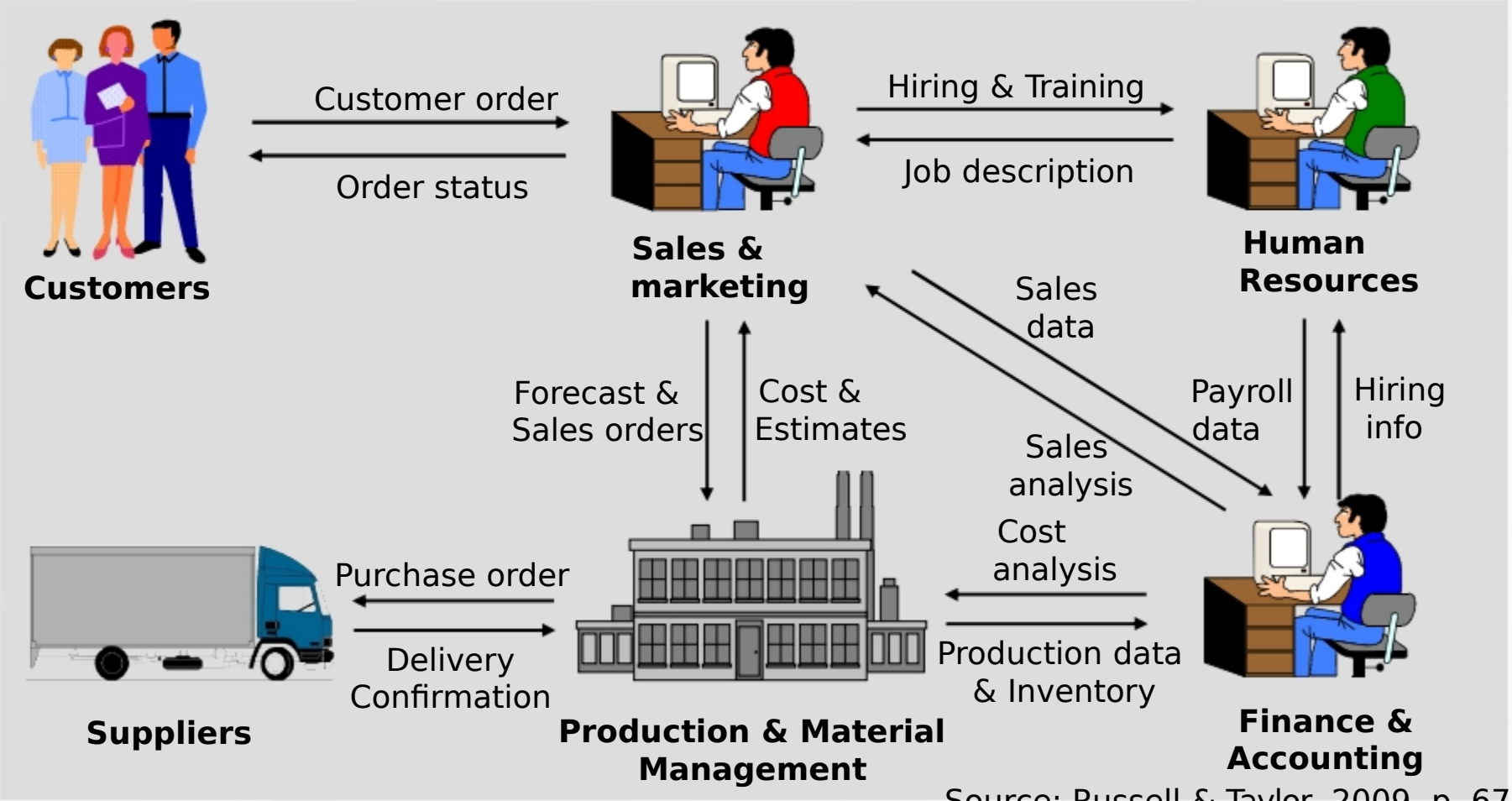
Source: Russell & Taylor, 2009, p. 652

ENTERPRICE RESOURCE PLANNING
Relaxing MRP assumptions

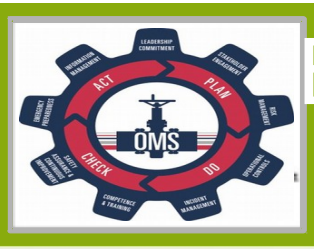


Source: Russell & Taylor, 2009, p. 667

ENTERPRICE RESOURCE PLANNING
ERP modules



Source: Russell & Taylor, 2009, p. 670



ENTERPRICE RESOURCE PLANNING
ERP implementation

- ERP implementations have a history of mammoth projects over budget, out-of-control and bringing companies to bankruptcy.

  - ERP implementation involves:
    - Analyse business process
    - Choose modules to implement
    - Align level of sophistication
    - Finalise delivery and access
    - Link with external partners

ENTERPRICE RESOURCE PLANNING
SAP ERP modules

mySAP Supply Chain Management

Strategic Planning	**Strategic Supply Chain Design**			**Strategic Sourcing**	
Demand Planning	**Forecasting & Lifecle Planning Supply**		**Promotion Planning**		**Consensus Demand Planing**
Supply Planning	**Safety Stock Planning**	**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**	**Crossdocking**	**Warehouse & Storage**	**Physical Inventory**
Order fulfilment	**Sales Order Processing**		**Logistics Coordination**		**Billing**
Transportation	**Transportation Planning**		**Transportation Execution**		**Freight Costing**
Visibility	**Procurement Visibility**	**Manufacturing Visibility**	**Fulfilment Visibility**	**Transportation Visibility**	**Supply Chain Analytics**

Source: SAP website

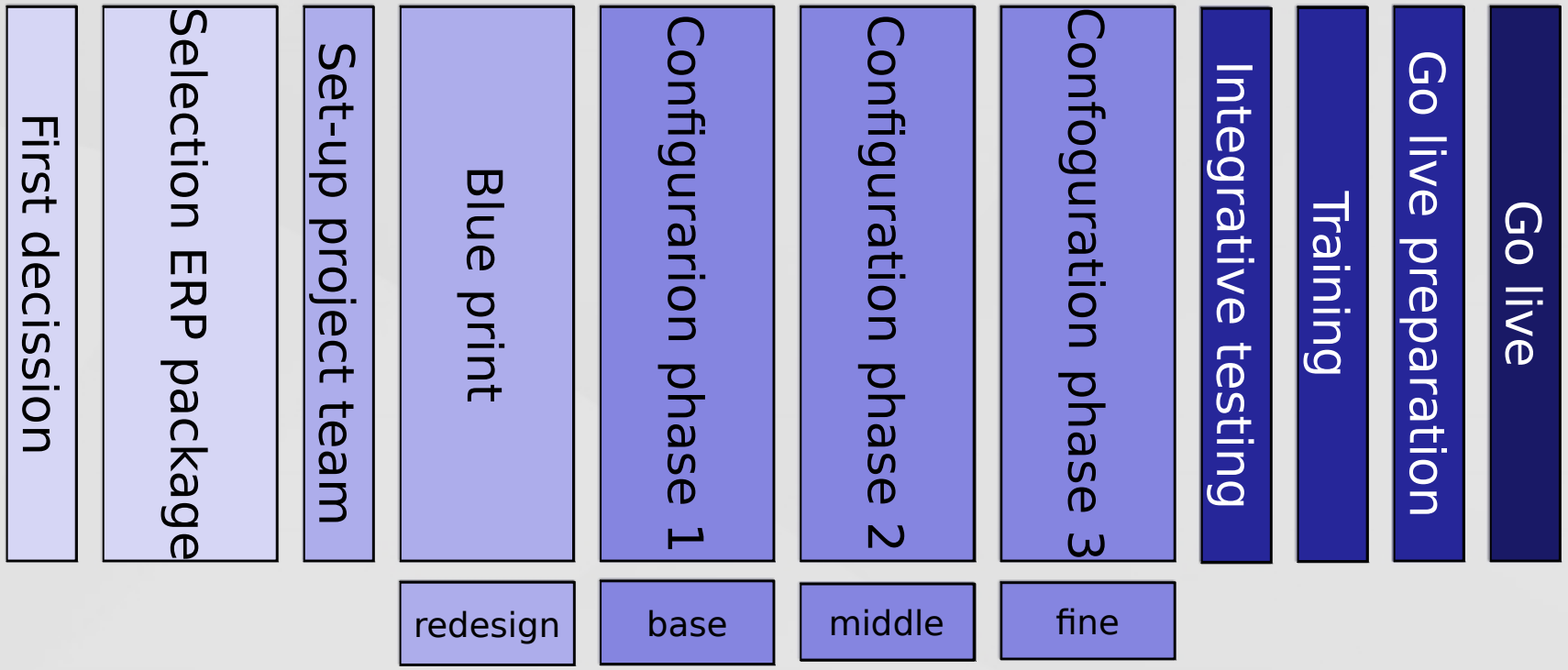
ENTERPRICE RESOURCE PLANNING
ERP implementation

- Industry solutions are best-practice templates designed to maximize efficiency and minimize customisation.

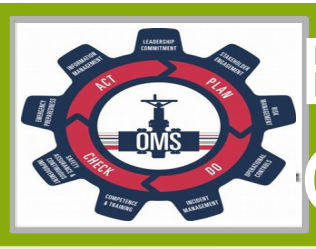
- Fast track implementation by standardised approach, for example AccelaratedSAP solution:
  - Phase 1: Project preparation
  - Phase 2: Business Blueprint
  - Phase 3: Realisation
  - Phase 4: Final preparation
  - Phase 5: Go Live & support

ENTERPRICE RESOURCE PLANNING
ERP project set-up

- Project steps ERP implementation



Source: Own compilation



ENTERPRICE RESOURCE PLANNING
Other ERP related software

- **Customer relationship management** (CRM) supports processes that involve customer interaction.
- **Supply chain management** (SCM) supports processes related to supply chains.
- **Product life cycle management** (PLM) supports the product development and the product life cycle.
- Difficulty is connection between systems across multiple companies: XML can be good solution.