Real Time Planning in Supply Chain Management
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Definition of “Real Time Planning in Supply Chain Management”

**Planning** is the process of thinking about and organizing the activities which are required to achieve a desired goal.

**Supply Chain Planning** is the process of thinking about and organizing the activities to get the right product, on-time, in quality, to the right place and to the lowest cost to satisfy the customer requirement.

**Real Time information** means that relevant information for decision making process is available with no delay in the timeliness of the information provided.

**Real Time action** means that decisions of the activities to be conducted can be communicated with no delay in the timeliness.

**Real Time simulation** means the possibility to simulate different alternative scenarios in real time.

Real Time Planning in the SCM context is the process of organizing all activities around gathering data without time delays, analyzing it and taking fact based real time decisions. By immediately sensing and detecting changes in demand, supply, and business conditions while utilizing advanced analytics, a true integration between planning and execution is achieved.

Source: [http://www.businessdictionary.com](http://www.businessdictionary.com);
[https://en.wikipedia.org/wiki/Planning](https://en.wikipedia.org/wiki/Planning);
based on: Feigin G. – Supply Chain Planning and Analytics
based on: Croushore, D. - "Frontiers of Real-Time Data Analysis"
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Prerequisite for the realization of Real Time Planning is to be connected in the supply chain

**Trends**

- **Customer integration**
  - Smart products enabling smart services (smart phones, connected drive etc.)
  - Production integration for one piece production and flexibility of demand planning and requirement fulfillment in high production variances
  - Big Data of customer information/needs and requirements of intelligent analytics

- **Vendor integration**
  - Development of products within strategic partnerships
    - Top-down: Sharing of short term forecasting of required materials
    - Bottom-up: transparency on capacities, JIT delivery dates and flexibility of requirement fulfillment (Consignment, VMI etc.)
  - Big Data of vendor performance for intelligent analytics

- **Smart factories** with highly automated and connected machines and production lines for increasing production efficiency
  - Usage of predictive maintenance in for seamless integration of detailed production planning, production maintenance and quality management
  - Connection of all production layers and systems for transparency on process and machine parameters, machine efficiency and stock availability

- **Smart logistics** with highly automated and connected distribution centers and transport vehicles for in- and outbound delivery
  - Big Data for smart warehousing and transporting and the requirement of intelligent analytics
  - Integration of 3PL etc.

Source: RWTH Aachen FU - Potenziale der Digitalisierung der Supply Chain

Haufe - Supply Chain Management - Mehr Kundenorientierung wagen...

Deloitte – University Press - Anticipatory supply chains
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How does the Real Time Planning approach influence service planning?

Case 1 - Service

How does the Real Time Planning approach influence maintenance planning?

Case 2 - Maintenance

Customer

Maintenance

Manufacturing

Service

Wind Power Supplier

Legend

Real Time Planning

Background

- **Customers** of Wind Power Suppliers (e.g. EON) requires ready to use wind turbine farms which are connected to the electricity network.

- The **new wind turbines** themselves (smart product) are full of sensors and automated controlling functions.

- The **wind farms** are connected to a **diagnostic center** as well as to a **control center**:  
  - The **control centers** steer the power production of the farm:  
    - Real time information on power supply requirements  
    - Real time weather conditions through sensors  
  - The **diagnostic centers** monitoring the status of the operational availability during runtime and maintenance cycles:  
    - Real time information on power supply availability  
    - Real time information on equipment (temperature, vibrations, runtime etc.)  
    - Real time information on maintenance activities on wind farms

- The **production** of the wind turbines itself is highly automated. Production lines, production supply areas and warehouses are connected via Internet of Things, which enables real time information of all production steps and localization of products, materials and equipment.

- The **business changes** from manufacturing to full service provider. Due to the lifecycle of the product itself the ratio of production for spare parts is increasing.
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Use Case 1: Unplanned Service for wind farm

Situation
Forecasted requirements for finished parts and semi-finished parts for new wind turbines, engineering and spare parts have been aligned with available capacity of production and external suppliers. Optimized sequencing has been calculated by Advanced Planning System (APS) and agreed Planner, Purchaser, Shop-floor and Warehouse.
Service Level Agreement w/ Customer: 100% delivery

Impact
- Alerts in the diagnostic center => wind turbines not running smoothly
- The maintenance service interval of the turbine not been reached yet
- No plan to exchange parts (no resources, no parts on stock)

System Activity
- Predictive maintenance
- Capacity evaluation
- Replenishment calculation
- Find cost-optimal solution
- Target and constraints evaluation

Data, information, constrains
- New data
  - Additional requirements
- Environment
  - Replenishment and stock situation
  - Costs for downtime, machine setup, storage, transport, capital
- Information/constraints
  - Maintenance schedule and resources
  - Inventory targets
  - Planning principles
  - Service level agreement for Service with Customer

Solution
- Automatic changes for topics which are on white list
- Prioritized alternatives for management decision
- Impact long term planning is input for IBP-Board

Stakeholder Impacts
- Thresholds
  - Maintenance schedule
  - Alternative sourcing
- KPI Re-Engineering
  - Forecasting of spares
  - Service level agreements
- Meeting Structure
  - Maintenance and planning
  - Heads of department
Use Case 2: Production Planning – Maintenance in Production

Situation
Forecasted requirements for finished parts and semi-finished parts for new wind turbines, engineering and spare parts have been aligned with available capacity of production and external suppliers. Optimized sequencing has been calculated by Advanced Planning System (APS) and agreed with MRP Controller (Planner), Purchaser, Shop-floor and Warehouse etc.

Impact
During production some unsteadiness of technical equipment occur. Sensors communicate alerts. Due to the alert of the equipment all relevant information will be collected.

System Activity
- Alternative transport
- Change-over, setup
- Change of sourcing
- Contract terms
- Check alternatives in supply network
- Simulate consequences of re-scheduling

Data, information, constrains
- Production orders
- Dependent requirements
- Technical equipment
- Alternative of handling (Slow down, repair-time etc.)?
- Alternative resources and capacities
- Alternative pegged dependent requirements
- Stakeholder list of planners, shop-floor, maintenance, warehouse etc.

Solution
- Alternative handling
- Stop production
- Disassemble
- Re-setup
- Re-schedule
- Alternative resource in the same location
- Re-prioritize production
- Change production sequencing on resources
- Alternative supply source determination
- Re-schedule production and transport plan

Stakeholder Impacts

Thresholds
- Automated re-scheduling
- Planning time fences

KPI Re-Engineering
- Responsibility of Overall Equipment Effectiveness, On-time Delivery, On-time In-Full etc.

Meeting Structure
- Early Morning Meeting
- S&OP short-term Meeting
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Distinct usage of Real Time Planning will have radical/profound impact on organizational and process-related procedures/behaviors

- Approach should be business and IT driven – integrating all involved stakeholder
- Path forward should in the first step shoot for alignment of all planning activities
- Second step will head for superior technology

The change of handling all areas, from process related to organizational related, sums up to an improvement in the whole company.
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