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Building Smarter Consumer Goods Supply Chain Videocast Series

Part III: Agility in Consumer Goods Demand Driven Manufacturing

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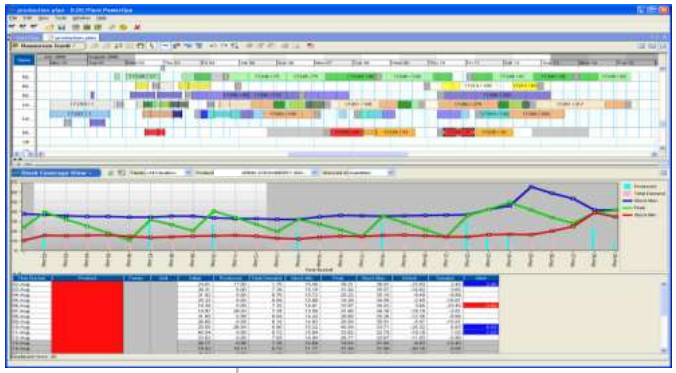
Agility in Consumer Goods Demand Driven Manufacturing



Improving Customer Service Despite Tight Production Constraints

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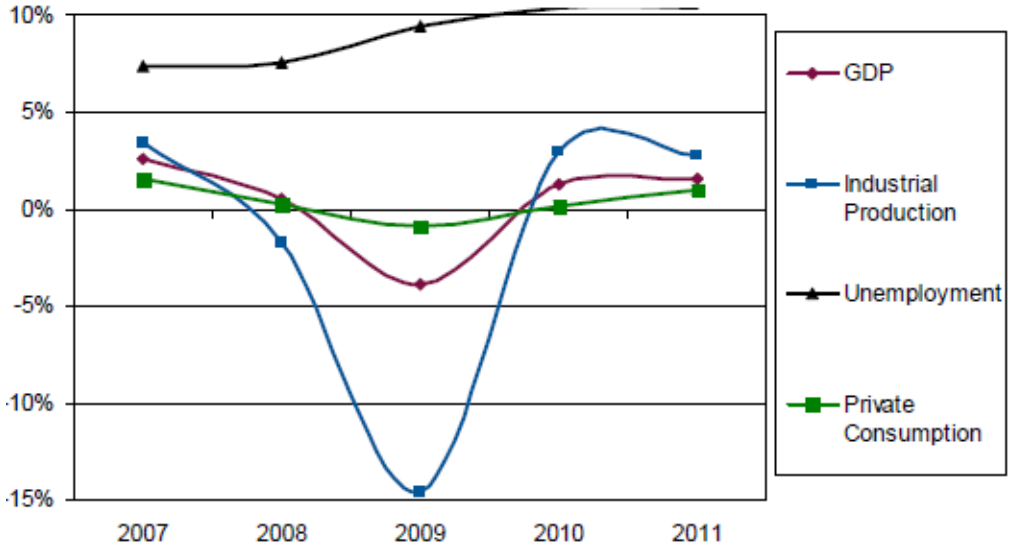
Agenda

- Business objectives and challenges
- Case Study 1: Synchronize production with truck loading under tight inventory constraints
- Case Study 2: Danone Fresh Dairy: improve service level and manufacturing efficiency
- Case Study 3: Synchronize production with inventory constraints to better manage promotions and product shelf life
- Factory Planning and Scheduling with IBM ILOG Plant PowerOps

Today's Business Challenges

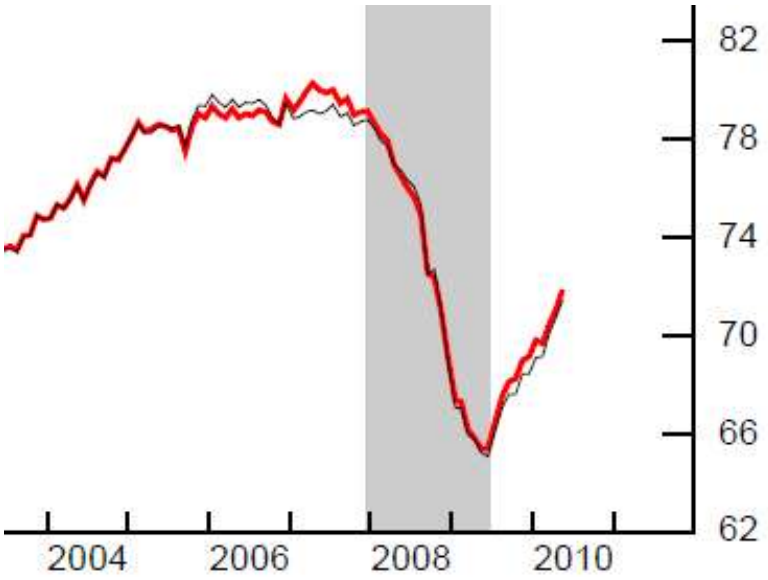
- Production in increasing and capacity is becoming again a tighter constraint

Industrial production trends



Source: IDC Manufacturing Insights, January 2010

Utilization: percent of capacity



Source: Federal Reserve, June 2010

Today's Business Challenges

- Production in increasing and capacity is becoming again a tighter constraint
- The ability to react to changing conditions is increasingly important

n = 415

Note: Respondents selected 3 out of 16 possible responses.

Source: IDC Manufacturing Insights' *2010 Supply Chain Survey*

Today's Business Challenges

- Production in increasing and capacity is becoming again a tighter constraint
- The ability to react to changing conditions is increasingly important
- AMR (Gartner): more that 50% manufacturing companies expect an increase in the number of SKUs to be introduced in the current capacity
  - Plants have closed therefore more SKUs are produced in the remaining plants
  - Supply Chain flexibility requires the ability to produce the same SKU in several plants
  - Volatile demand, Increased use of shared assets

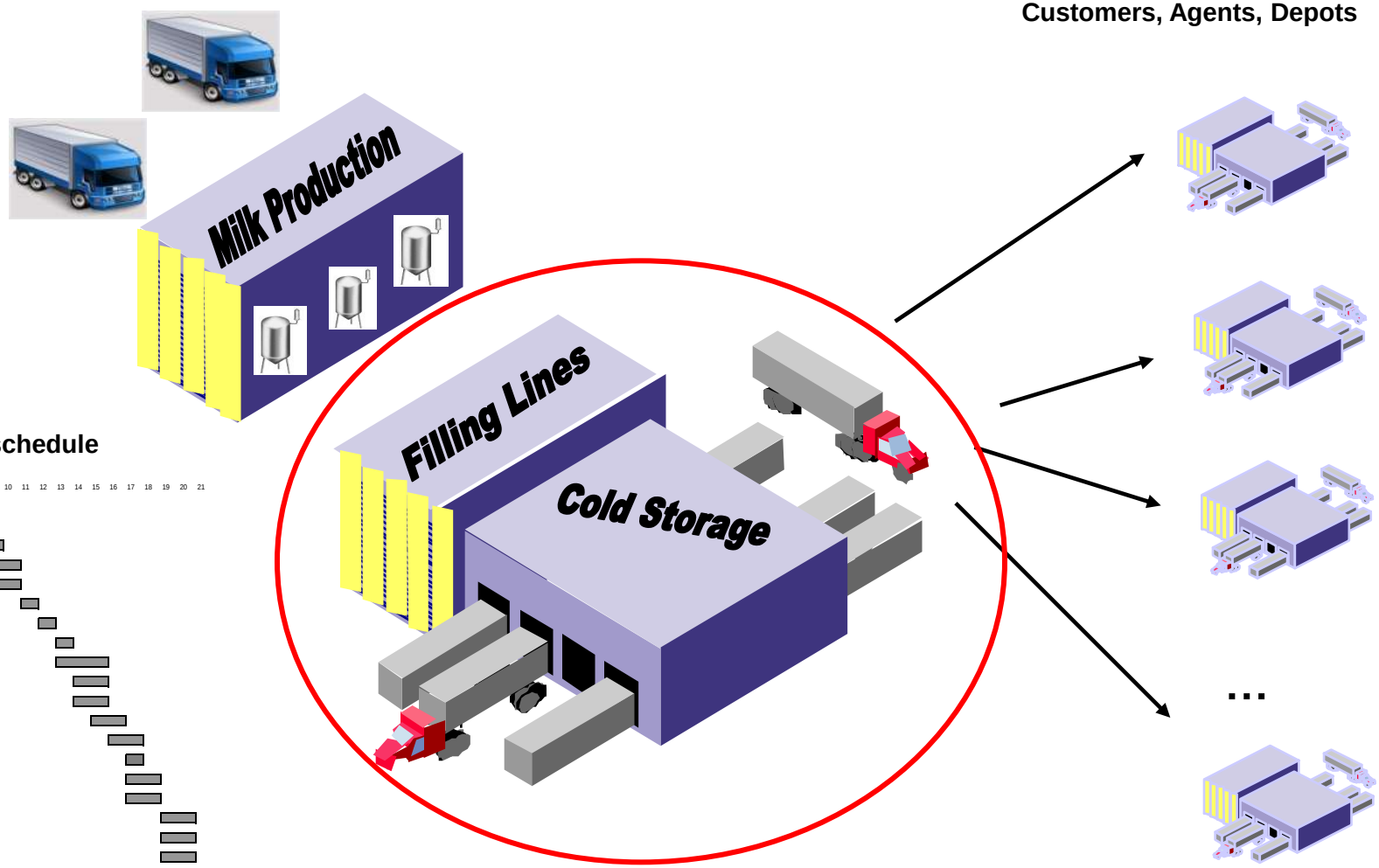
Today's Business Challenges

- Production in increasing and capacity is becoming again a tighter constraint
- The ability to react to changing conditions is increasingly important
- AMR (Gartner): more that 50% manufacturing companies expect an increase in the number of SKUs to be introduced in the current capacity

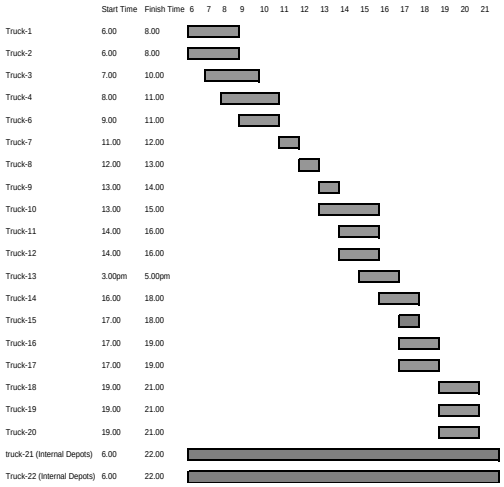
Meet the Challenges – smarter decision support systems are needed

- The increased complexity is hard to be managed simply by improving automation of manual decisions
  - E.g. MS Excel can speed up a manual planning process, but will not reduce the complexity of the decisions to be made
- Simple planning and scheduling tools cannot not help anymore
- A better synchronization between Manufacturing and Supply Chain is necessary

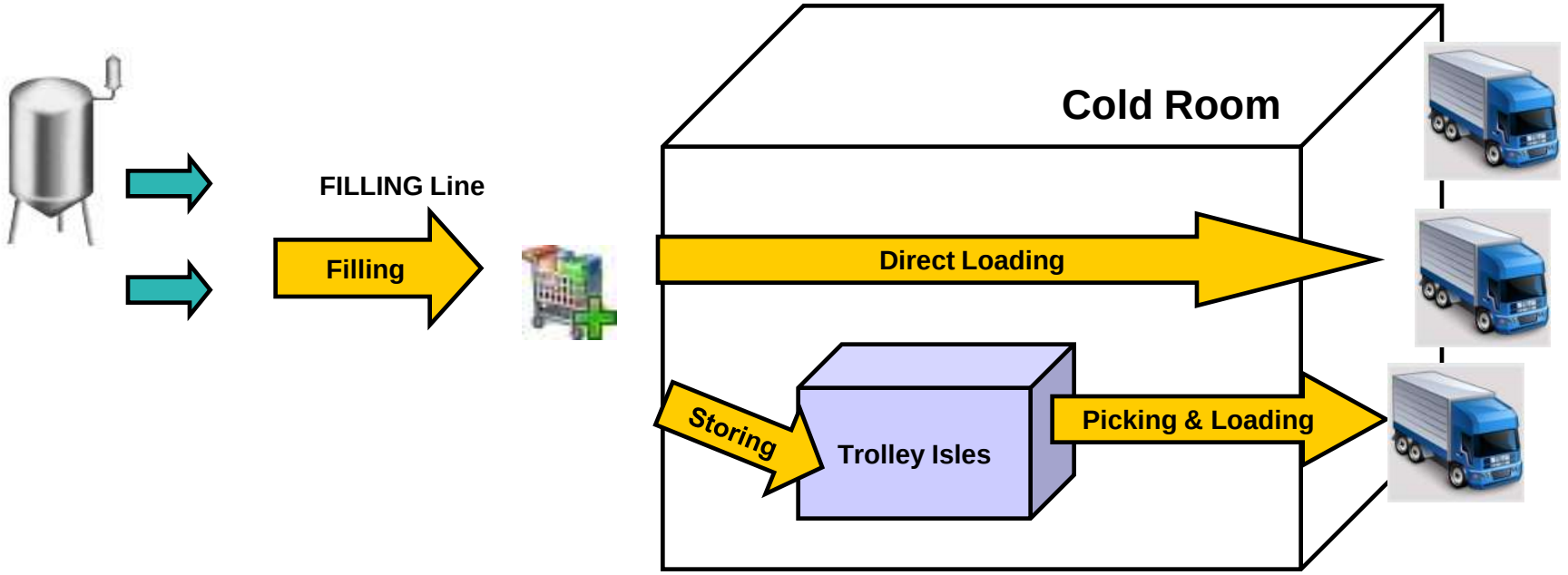
Case 1: Synchronize production with truck loading under tight inventory constraints

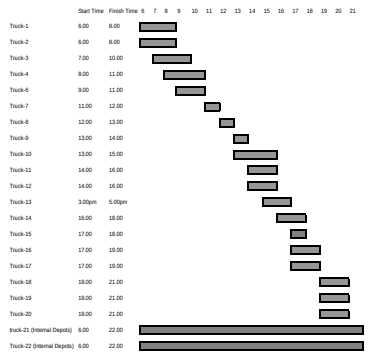


Daily truck load schedule



The manufacturing process





Business goals and challenges

- Supply Chain and Manufacturing goals:
  - Improve truck load fulfilment
  - Manage last minute changes in demand in ultra fresh environment
  - Improve throughput and operational efficiency
  - Reduce no-added value activities (changeovers and storing & picking in the Cold Room)

- Challenges and Constraints:
  - filling and packaging line produce up to 20 different SKUs per day
  - Multi-dimensional changeovers (bottle change, milk change, package change)
  - Tight finished good storage capacity. E.g. one hour of production
  - About 20 trucks a day, each one with its tight time window for loading
  - Every truck load requires most of the SKUs

A complex problem

- Pull production from demand
  - ➔ reduces no-added value activity in the warehouse and requires limited inventory capacity
  - ➔ requires short production runs and generates high changeover costs
- Pre-build production to efficiently use filling lines
  - ➔ long production runs reduce changeover costs, but increase no-added value activity in the warehouse
  - ➔ Tight inventory capacity become a bottleneck and may make long production runs infeasible
- The right tradeoffs between the two approaches is very hard to find and dependents on the shipments planned in the specific time window

- Decoupling production from logistics is impossible
  - the tight storage capacity (able to hold no more than a few hours of production)
  - late information on the actual demand and tight product shelf life
- Lean manufacturing techniques cannot be used
  - The high number the SKUs to be produced per shift and the long and costly changeovers do not allow to use Kanban techniques

How can we meet the challenges

- An integrated planning and scheduling system with sophisticated optimization algorithms is necessary:
  - To determine the right production batch sizes and production sequences that:
    - Minimizes changeover times and costs
    - Respects the cold storage constraints
    - Meets truck schedule
  - To frequently re-plan and reschedule. Adjust the plan based on updated information on the customer demand
  - High frequency of changes in demand during the day
    - Any planning process based on manual decisions is cumbersome and generates plans of poor quality with respect to the objective of efficiency and fulfillment

Results and Benefits

- Increased daily throughput
- Deliver the expected fill rate (98%)
- Reduced total time spent in changeovers
- Reduced no-added value activities (storing & picking)

- Ability to replan and reschedule several times per day to better respond to changes in demand

Case 2: Fresh Dairy Manufacturing Process

Milk

- Cow
- Soy

- Setup times

Pasteurizers

Fermentation tanks

- Capacity
- Batch size

- Semi-finished product

Storage Tanks

- Connectivity
- Compatibility

Filling Lines

- Multi-purpose
- Setup times
- Cleaning in place

- Safety stock
- Shelf life

Finished Product

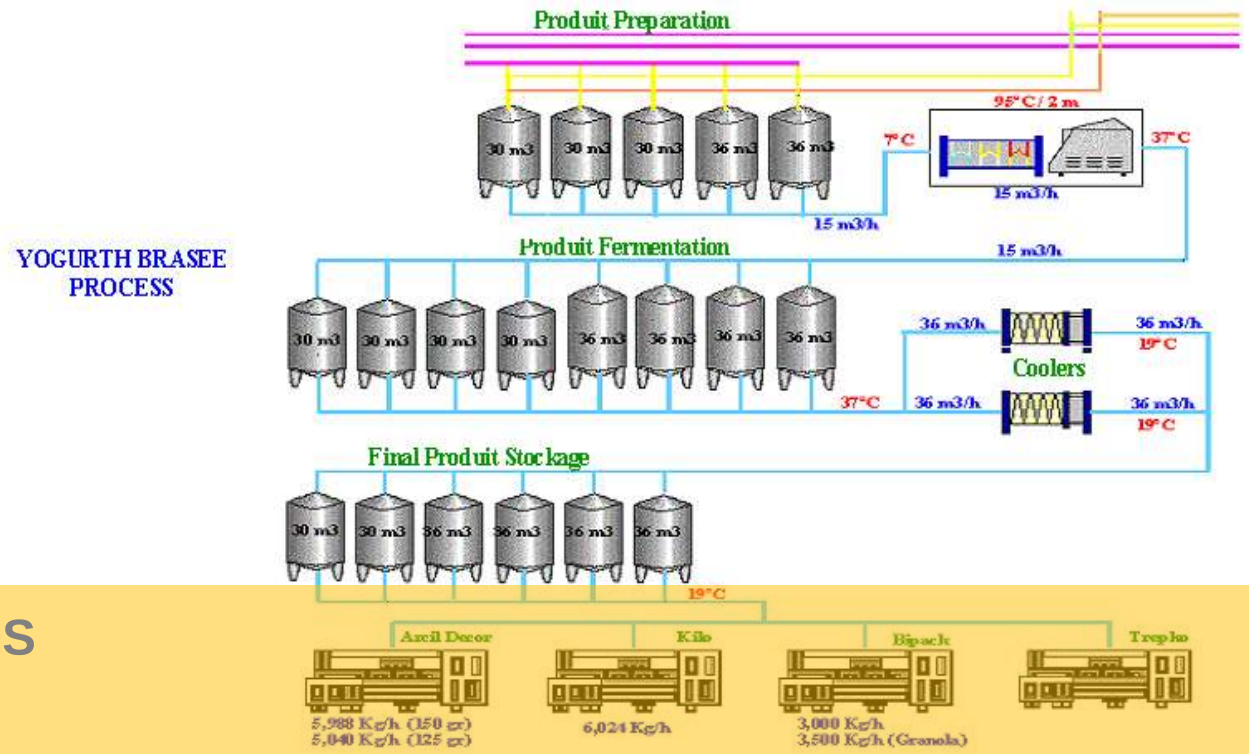
Three Major Business Challenges

- Meeting Demand
  - High demand variability
  - Short shelf life of intermediate products and finished goods
  - Relatively long production lead times (3 to 4 days)
- Manufacturing Efficiency
  - Maximize resource utilization, operational efficiency and throughput
  - Minimize waste
  - Maximize manufacturing predictability
  - Management of tanks, fill rate, equipment connections
  - Management of batching and cleaning policies
- Quality
  - Compliance to traceability and sanitary regulations

PP/DS+ project = SAP APO PP/DS + ILOG PPO

White mass (semi-finished)

Finished products



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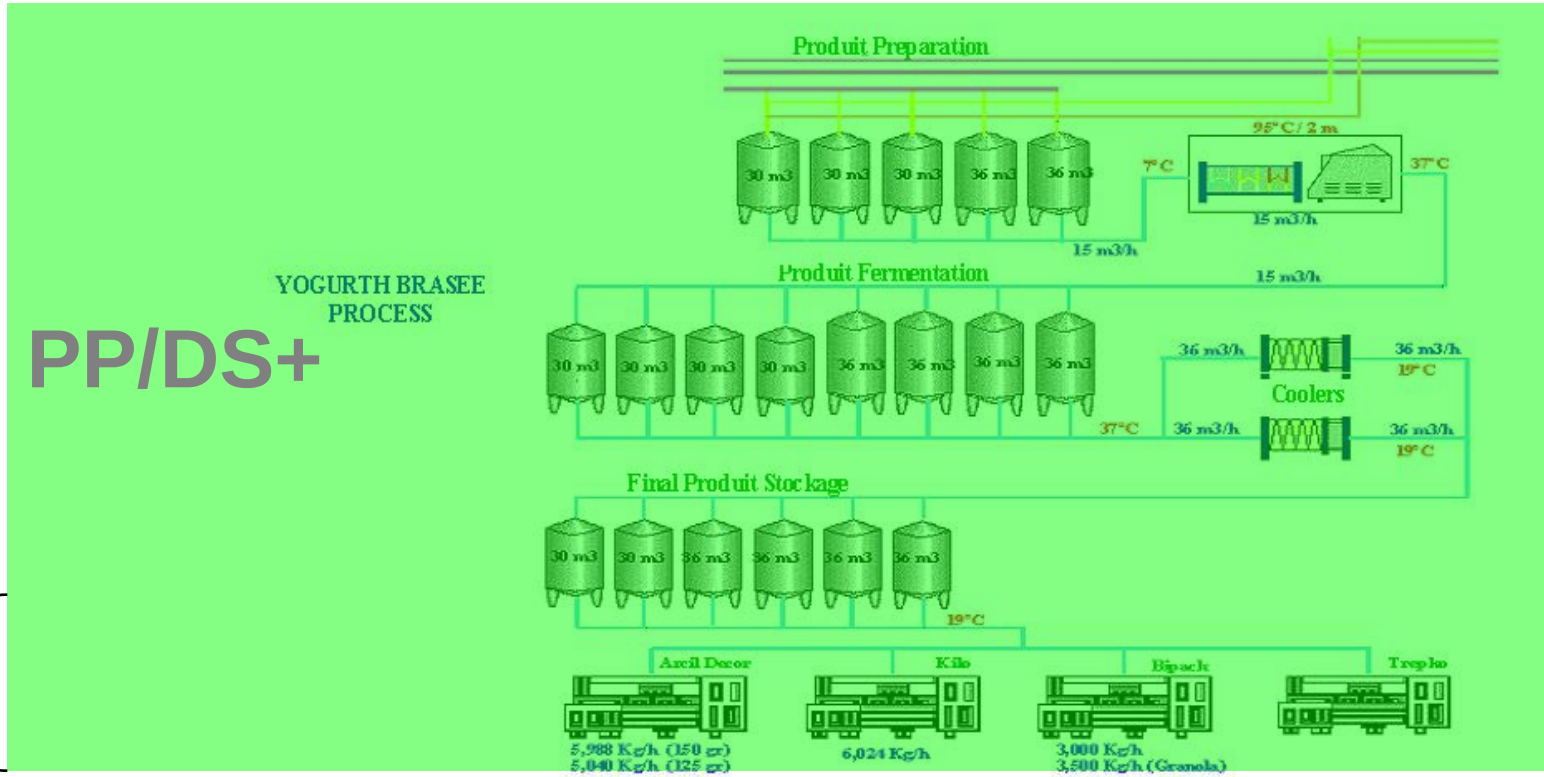
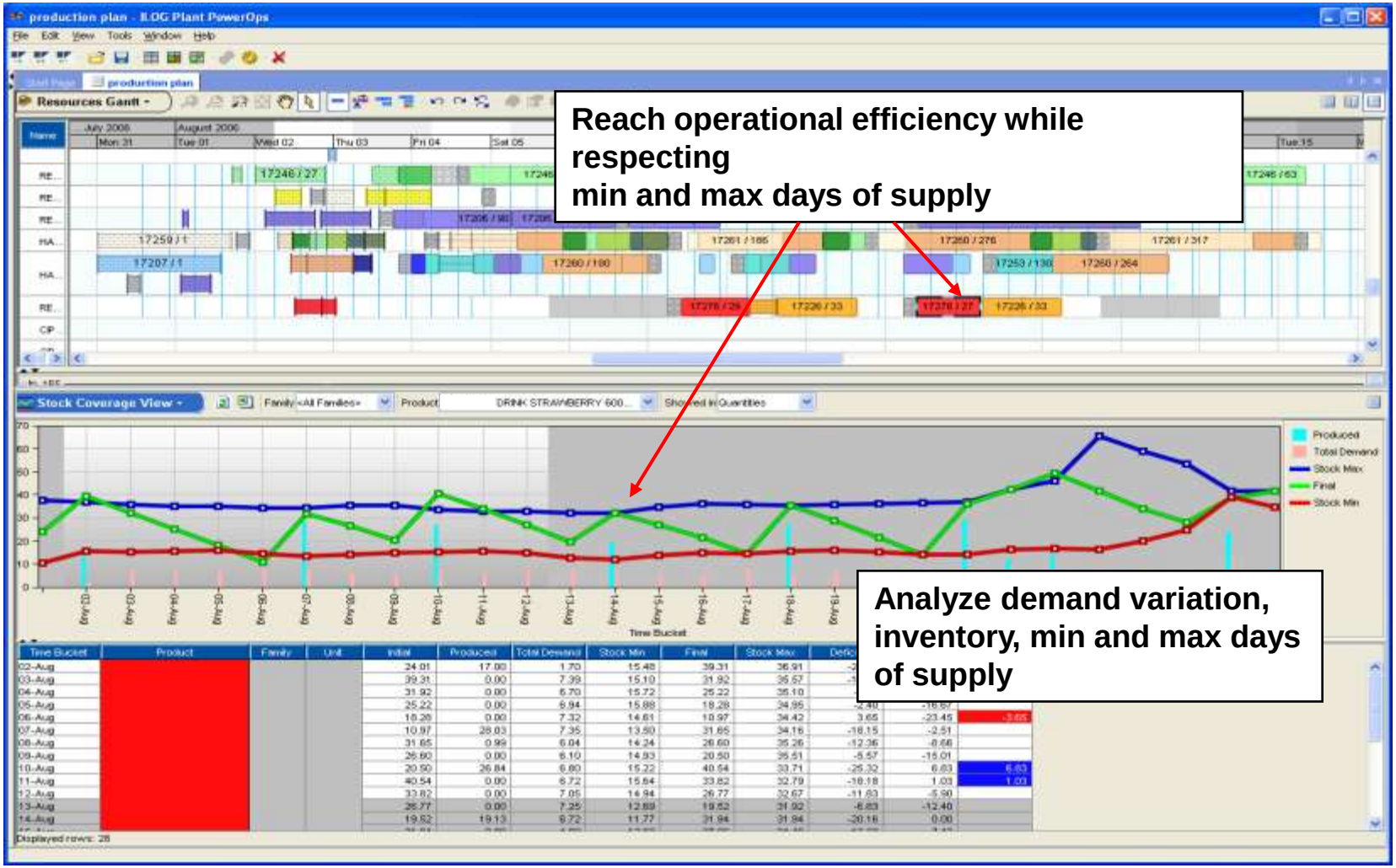
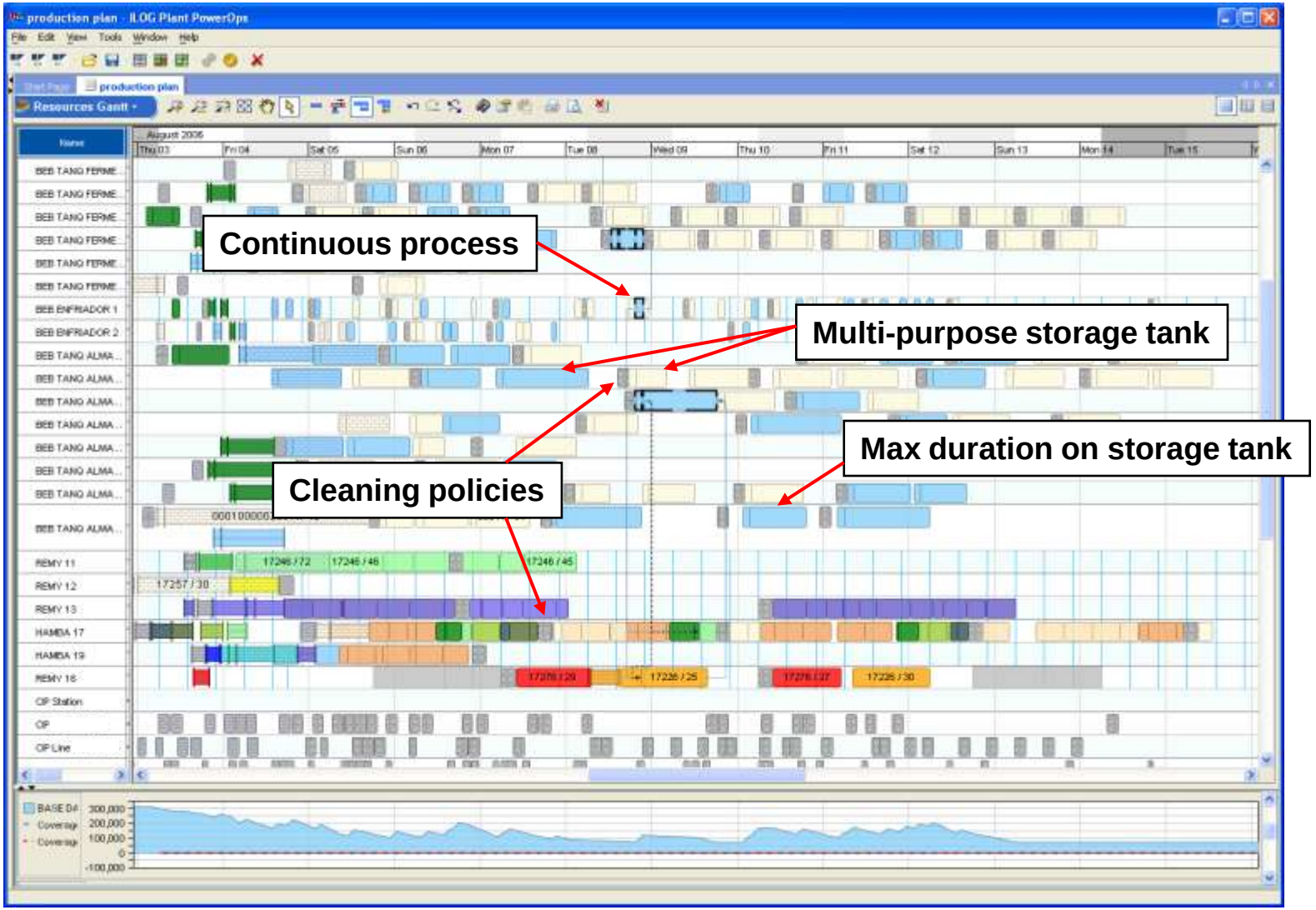


Integrated planning and scheduling at Danone



Managing plant floor constraints at Danone



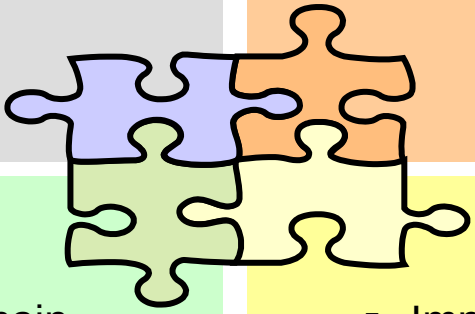
Key benefits for Danone De Mexico

Information System

- Full SAP integration
- Modeling of both finished and semi-finished products
- Repeatable core-model

User

- Very good user acceptance
- Easy to learn, easy to use
- Decision support system for planners with plan editing capabilities



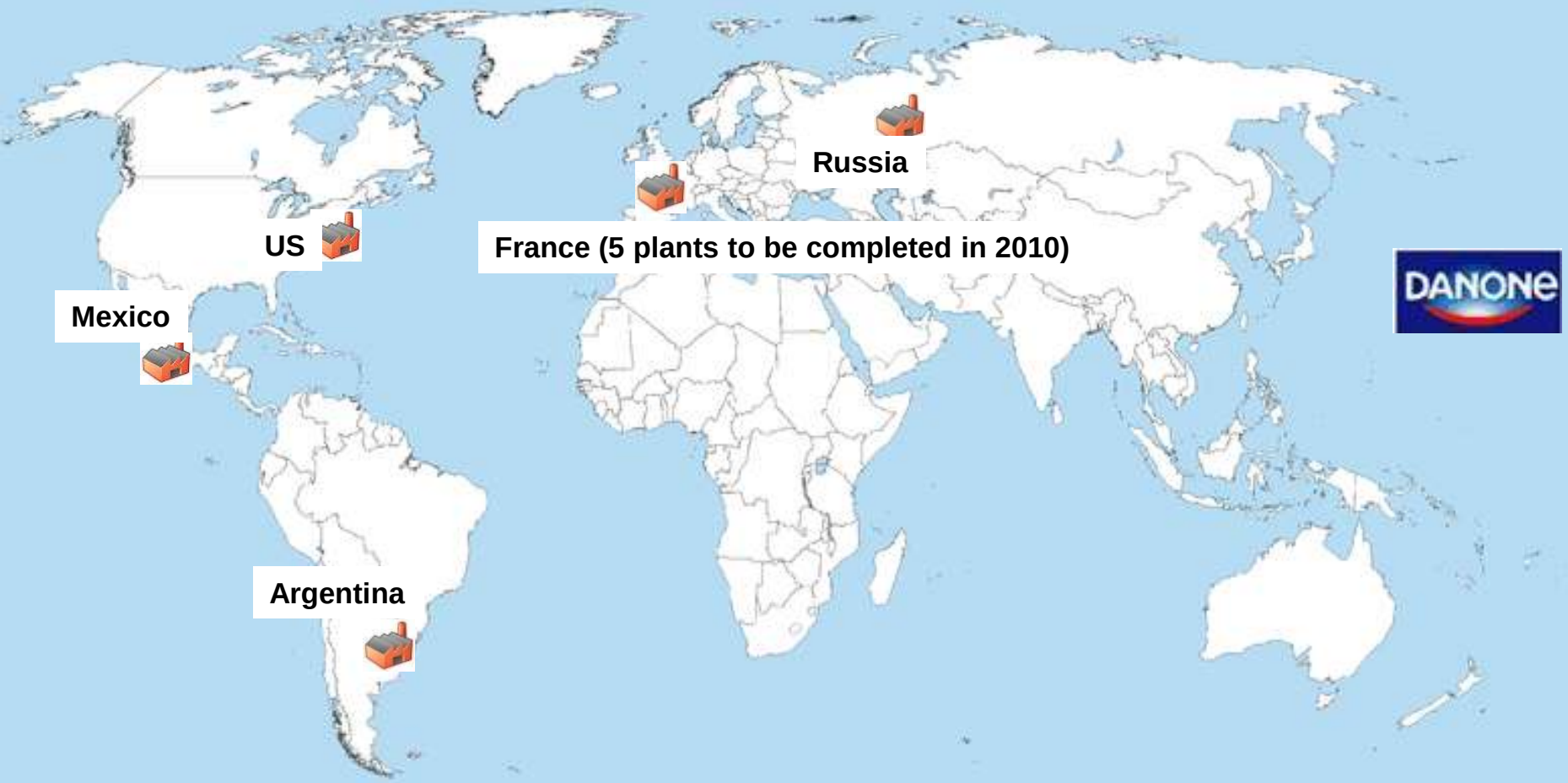
Organization

- Manufacturing and Supply Chain are using the same tool
- Daily (weekly before) planning
  - Improve reactivity
- Detailed planning delivered to manufacturing

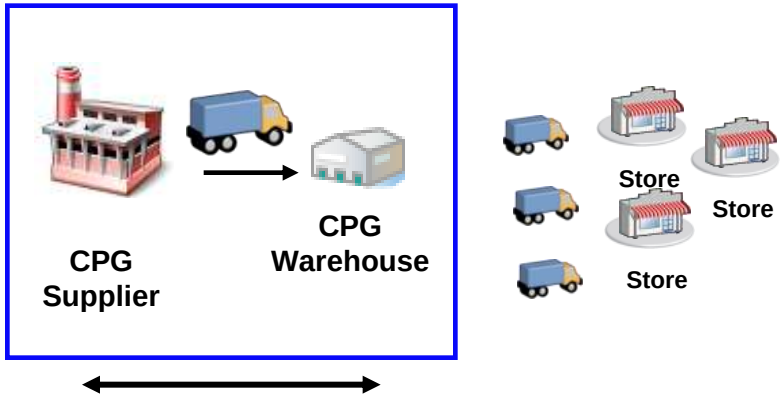
Process

- Improve
  - Operation Efficiency/Utilization
  - Service level
  - Inventory corridor
- Deliver executable Plan
  - Finished products & white mass
  - Cleaning & changeovers
- Planning and scheduling integrated

Danone Status of Global Rollout



Case 3 Synchronize production with inventory coverage to better manage promotions and product shelf life

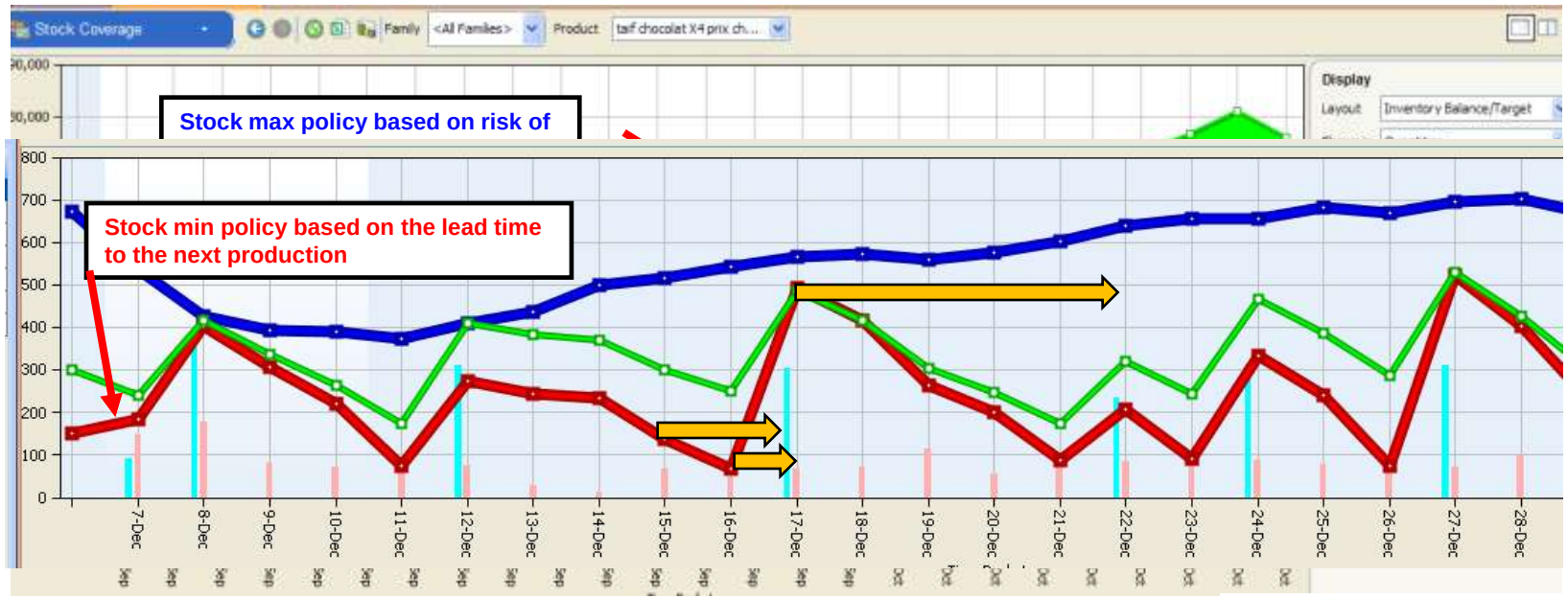


Business goals and challenges

- Supply Chain goals:
  - Better manage new product introduction and promotional products: reduce inventory surplus and stock outs
- Manufacturing goals:
  - Improve throughput and operational efficiency
- Challenges and Constraints:
  - High demand variability
  - Mix of promotional products and regular products
  - High changeover times and costs
  - Maturation time and shelf life on finished products

Non promotional products

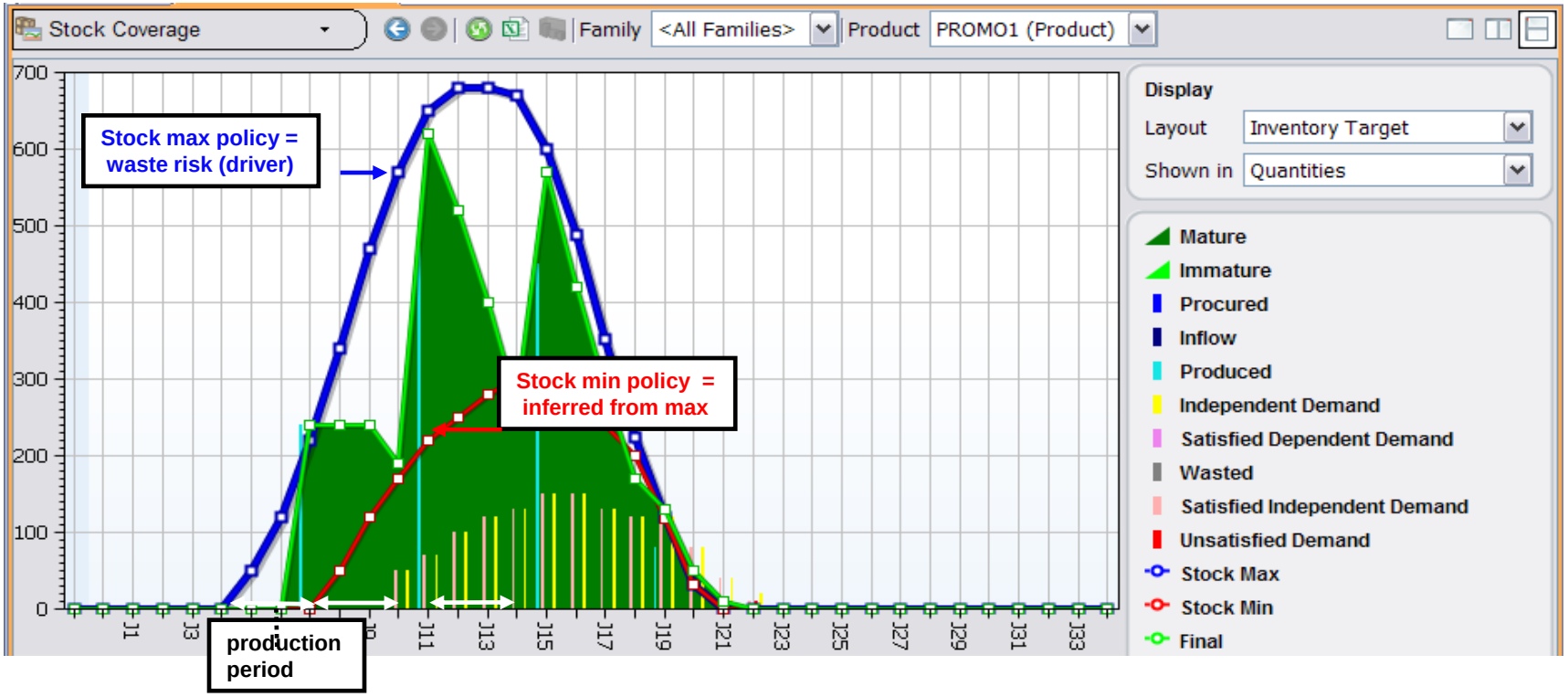
- Synchronize inventory targets with production plans
  - Production is driven by minimal stock requirements
  - The safety stock on product P in the CPG Warehouse is necessary to protect against fluctuations occurring “until the next production” is available in the CPG warehouse.
  - Min Days of Supply rules of thumb do not consider actual planned lead times
    - Generate higher than necessary inventory positions
  - The optimal safety stock is computed based on the planned lead times as opposed to average lead times.



PATENTED PENDING

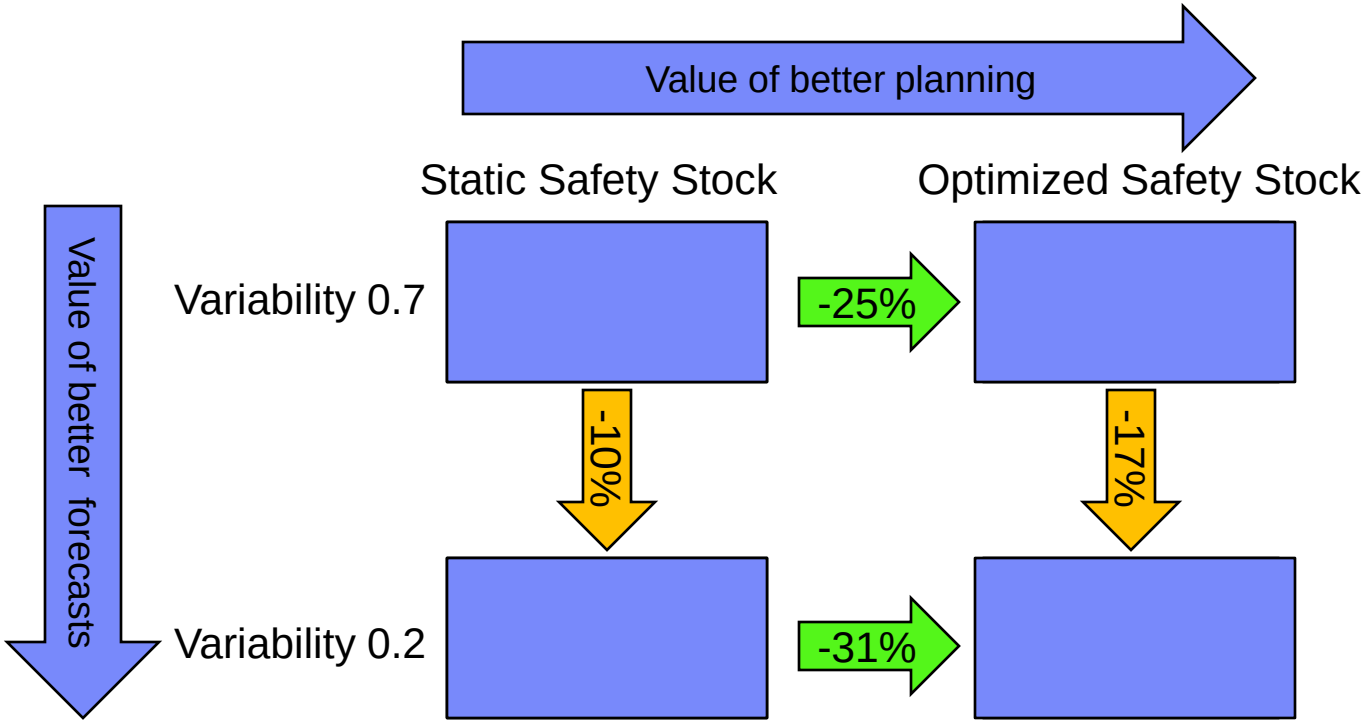
Promotional products

- Synchronize inventory targets with production plans
  - For promotional SKU the minimization of product waste is the main driver
    - Excess of inventory towards the end of the promotional period generate high risk of waste
  - The stock min policy is inferred from the max policy.
    - It enables the planner to drive production in a very regular way respecting a given *production period*.
    - It prevents excess of pre-build.



Inventory Drivers

- Global Optimization can identify hidden inventory drivers
- Data driven versus gut feel decisions on inventory reduction
  - The reduction of forecast error is often seen as the key driver for reducing inventories

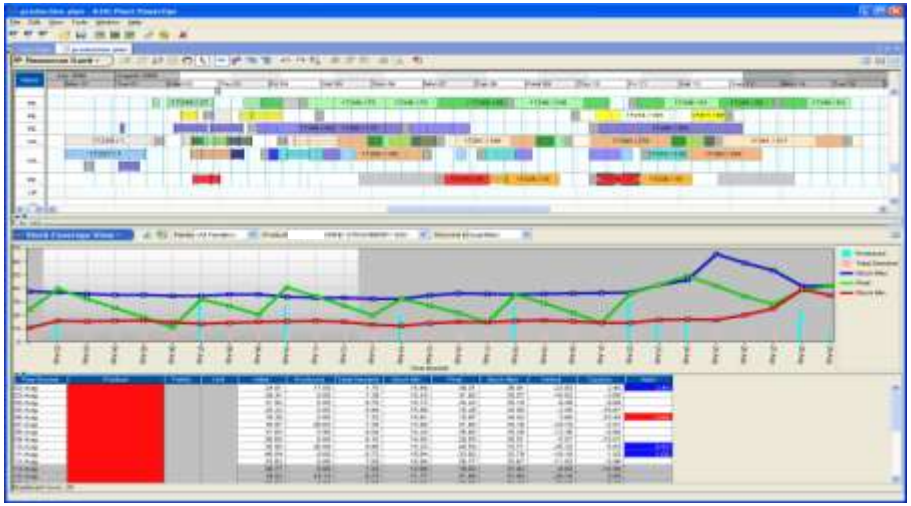


IBM ILOG Plant PowerOps: Smart Integrated Planning & Scheduling for batch process and hybrid plants

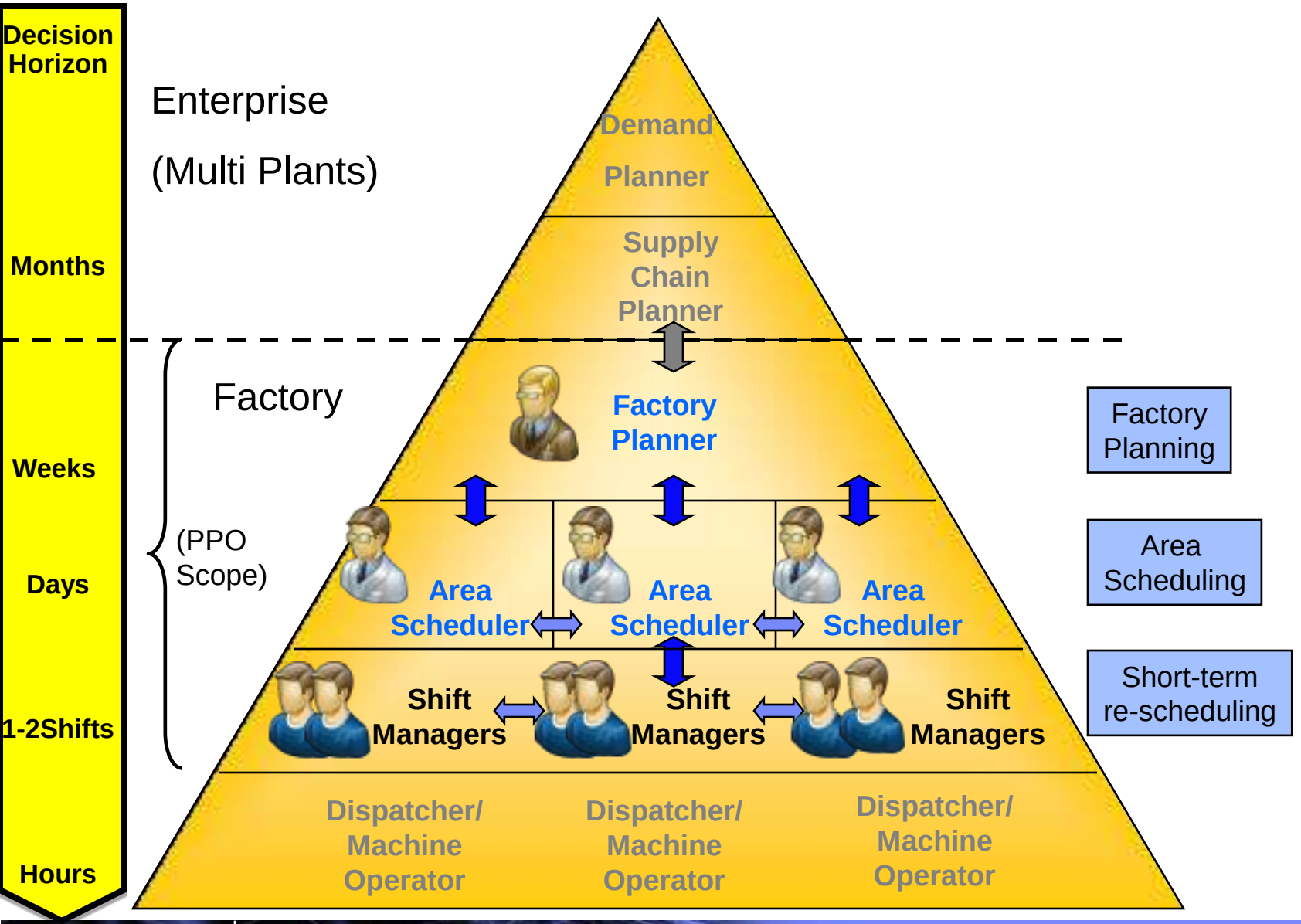
→ **Smart**

→ **Integrated Planning and Scheduling**

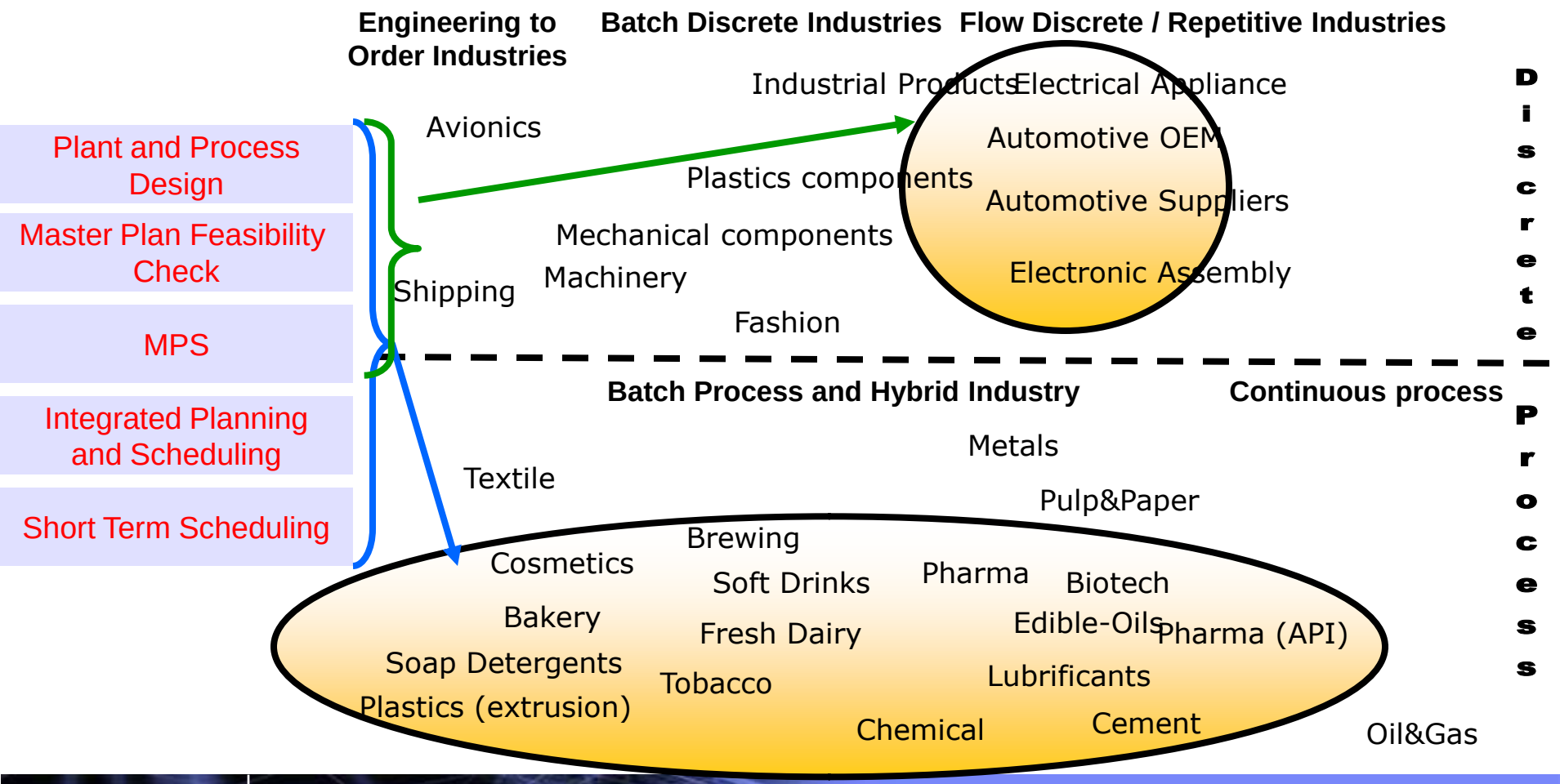
→ **For batch process and hybrid plants**



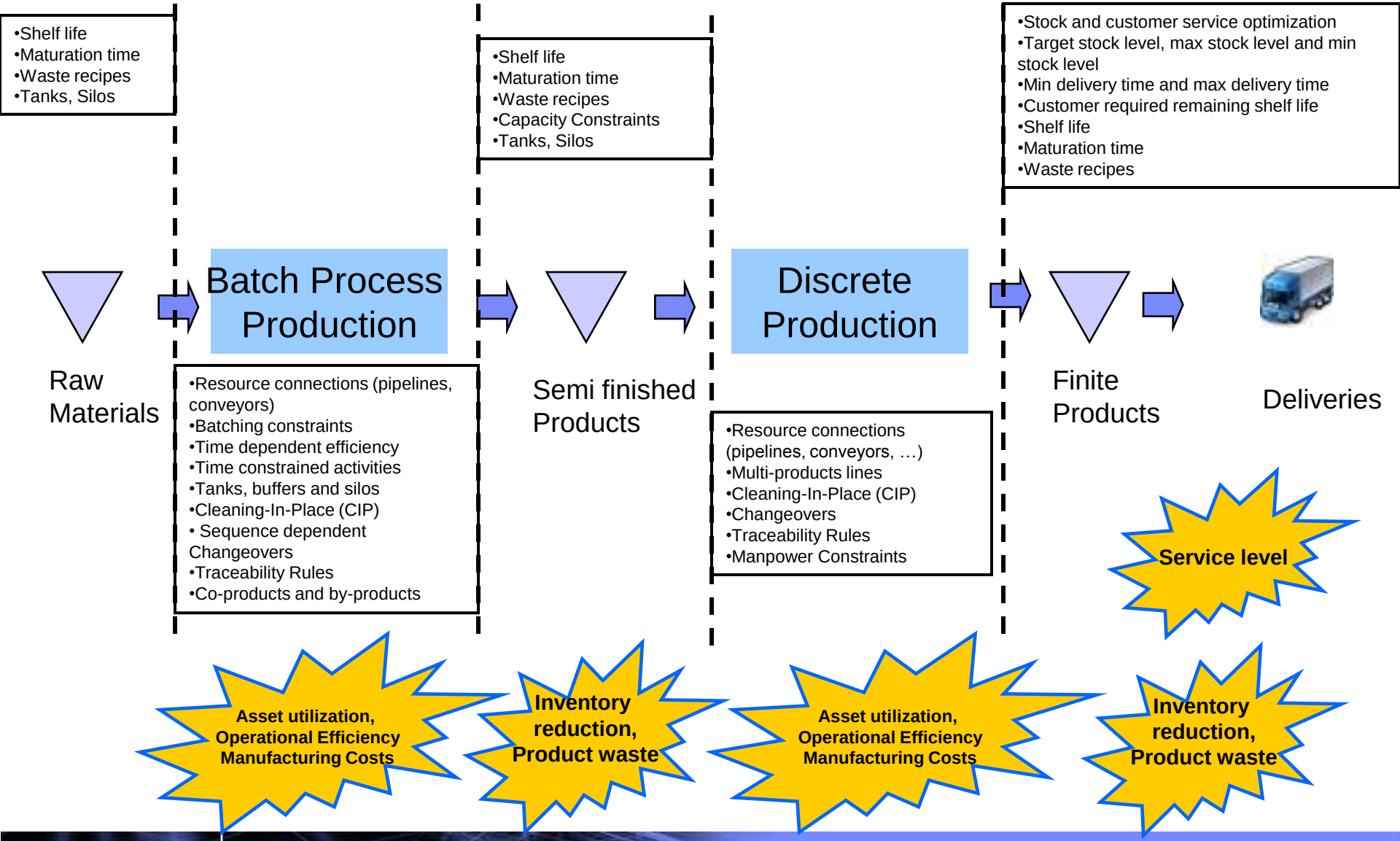
Roles and processes



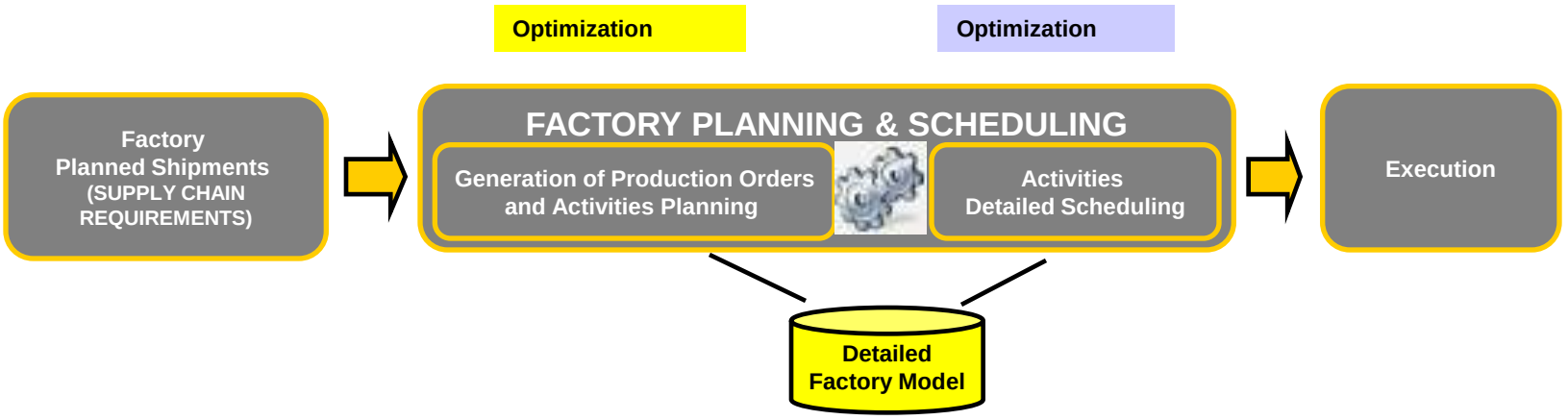
PPO Coverage: Market and Processes



A complex production environment



The innovative PPO approach

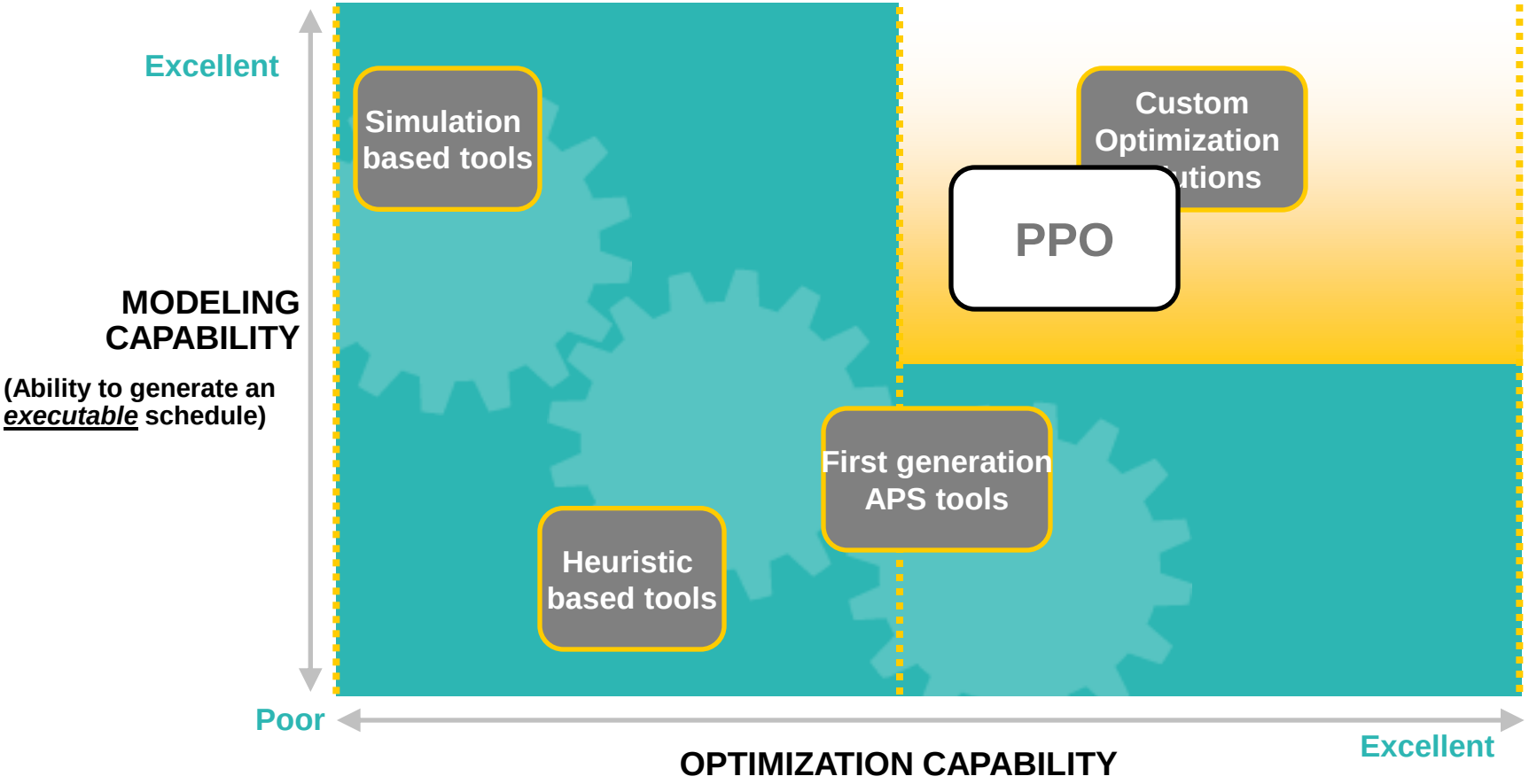


The sharing of the same detailed factory model allows the planning engine to take into account detailed production constraints.

A planning optimization engine in PPO is used in conjunction with a scheduling engine to provide a high quality feasible and optimized detailed schedule.

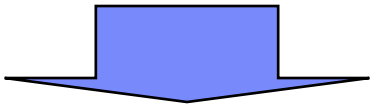
A rich set of advanced planning features allows the creation of feasible and optimized production plan with any time bucket granularity (day, shift, hour, …) even in presence of relevant changeover times.

PPO: more modeling capability and more optimization



Excellence in Manufacturing Operations requires moving from a local optimization approaches to holistic ones

OEE is focused on single piece of equipment (e.g. a Packaging Line)



Holistic view: a set of global often conflicting objectives, each one with its relative importance.

In order to be competitive, manufacturing companies need to take into account each one of them.

Excellence in Operational Efficiency & Throughput Excellence in Demands Fulfillment Excellence in reacting to change of the demands Excellence in production cost containment Excellence in product quality	Excellence in waste minimization Excellence in inbound/production/outbound synchronization Excellence in regulatory compliance Excellence in environmental impact

Planning & Scheduling decisions have a relevant impact on the company performances

The quality of production Planning & Scheduling decisions:

- How much to produce
- Where to produce
- When to produce

has a direct impact on the excellence objectives.

Excellence in Operational Efficiency & Throughput Excellence in Demands Fulfillment Excellence in reacting to change of the demands Excellence in production cost containment Excellence in product quality	Excellence in waste minimization Excellence in inbound/production/outbound synchronization Excellence in regulatory compliance Excellence in environmental impact

Manufacturing Excellence requires Smart Planning & Scheduling

- Smart Planning & Scheduling focuses on supporting the user to generate **feasible high quality production schedules** through advanced modelling capabilities and high performance optimization engines.

- Minor human intervention is needed.

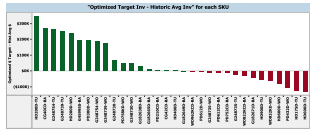
IBM ILOG Optimization and Supply Chain Solutions

- **Network optimization** for facility locating, store assignment, managing seasonality, and carbon footprint. Value: 5-15% reduction in supply chain costs, better service to stores

- **Production optimization** for determining best plans and schedules in batch process environment. Value: improved throughput, reduction in costs, reduction in inventory, leaner plants

- **Sourcing optimization** for on-going multi-plant production sourcing and capital investment decisions. Value: enhanced S&OP capability, 2-5% reduction in manufacturing costs

- **Enterprise multi-echelon inventory optimization** for integrated inventory planning within your ERP system. Value: 10-30% reduction in inventory costs, better fill rates.



- **Transportation optimization** for routing analysis, static and dynamic routes, backhaul, mode selection, and fleet sizing. Value: 10-30% reduction in trans costs

- **Strategic multi-echelon inventory optimization** for analysis to determine strategic shifts in your inventory policies and practices. Value: 25-50% reduction in inventory

Resources

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IBM Supply Chain Management:

http://www-935.ibm.com/services/us/index.wss/bus_serv/gbs/a1005268