Decision Making for High Performance

Demand-Pull Supply Chain Management

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Improving supply chains decision making
- DJE Conference

Stavanger, February 27, 2013

Who We Are

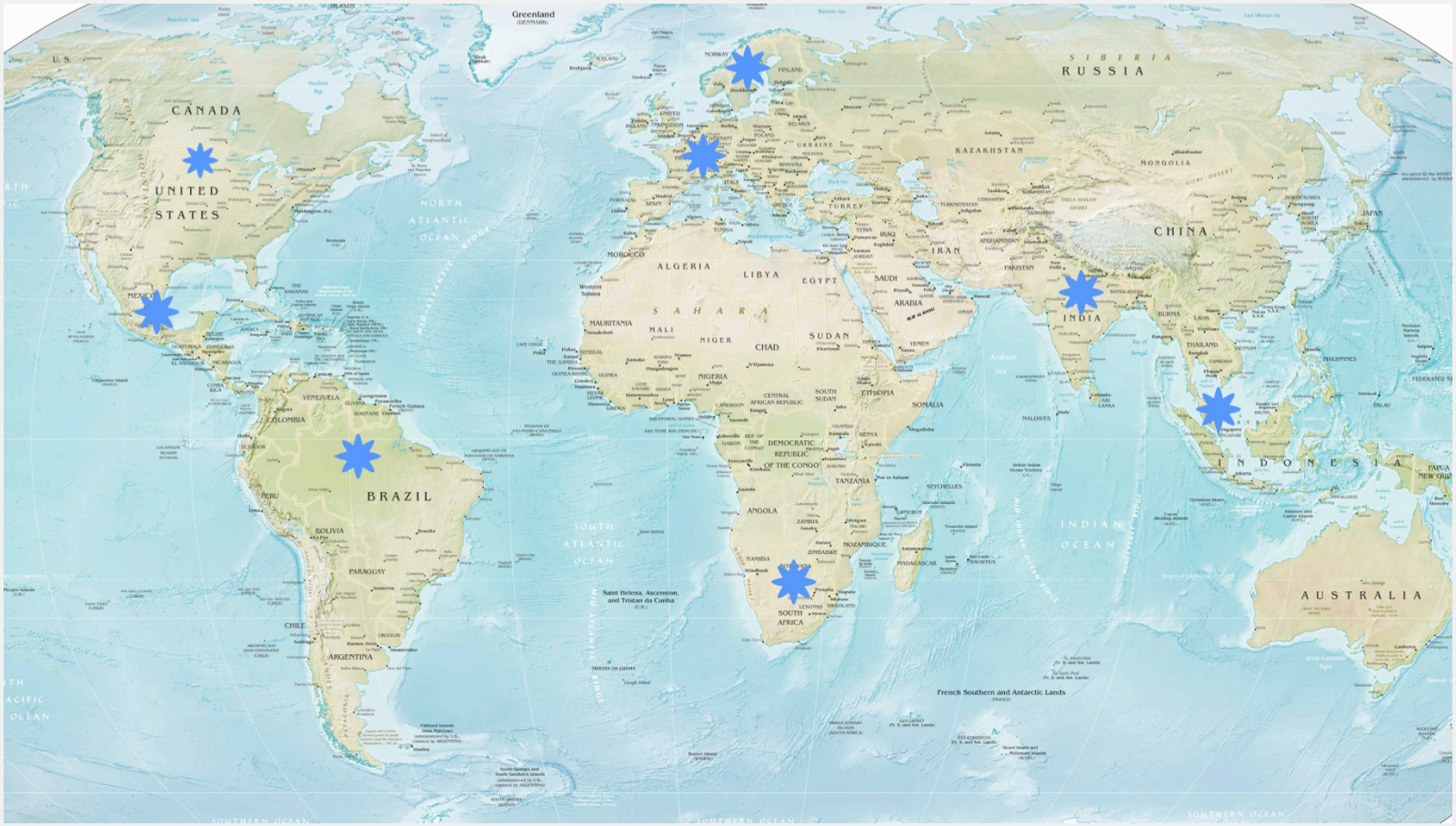
Elegant Solutions for Complex Problems

International management consulting firm focused on operations management excellence.

- Operations Excellence
- Performance Management
- Project Management
- Supply Chain Management

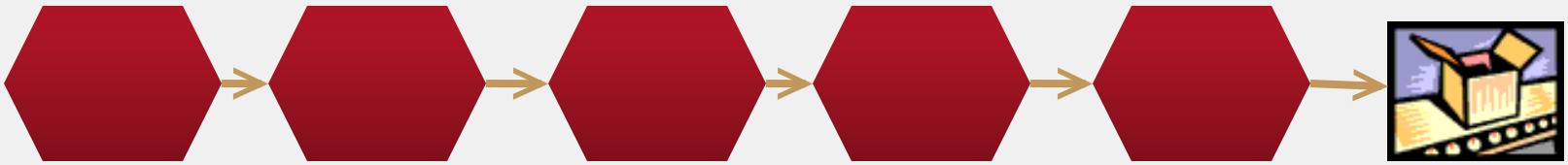
PINNACLE STRATEGIES

Where We Work

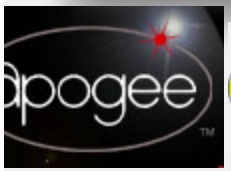


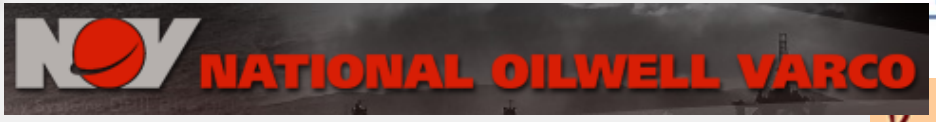
What We Do

- Supply Chain Management
- Project Management / Operations
- Operations Excellence / Continuous Improvement
- Performance Management



Some of Our Clients





Supply Chain Management

"The **design, planning, execution, control**, and monitoring of supply chain activities with the **objective of creating net value**, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally." [APICS Dictionary 13th ed.]

Inventory Is Constitutive

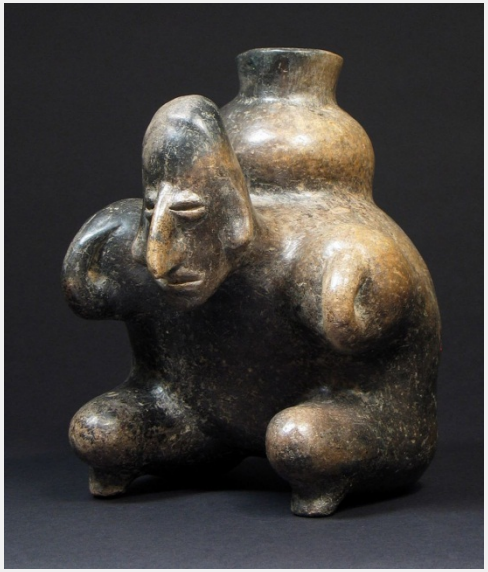
Performance Disruptions…

…Drive Customers away

Inventory Is Necessary…

- Covers Uncertainty
  - Demand
  - Supply
- Covers Process Variation
  - Engineering changes
  - Machine Breakdowns
  - Worker error
- Covers Synchronization Mistakes
  - Gap between planning cycles
  - Differences between formal and informal system
- **Reducing inventory without addressing process increases risk to delivery performance**

...But May Become a Burden

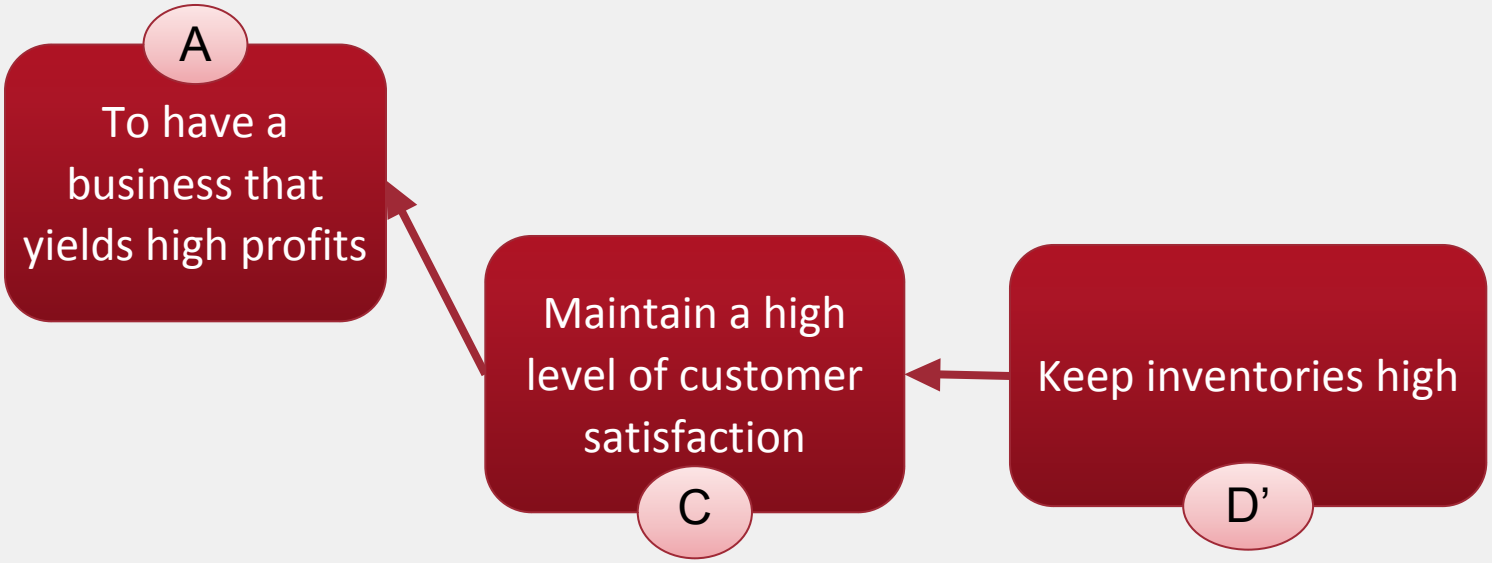


- Inventory levels are consuming too much cash, constraining growth
- Too much inventory is written off
- Excessive shortages to final assembly
  - Excessive spending to catch up
  - Customer service degradation
- Be more responsive to the market
  - Lead times are too long
  - Product variety (customization) is too low

Inventory is the Result of Policies

- Policies to resolve process uncertainty
- Formalized Policies in ERP
  - Min/Max / order parameters
  - Lead time / flow time
  - Lot sizes
- Management Measurements/Behavior Reinforcement
  - On time work orders completion
  - On time releases
- Informal polices on the shop floor
  - Early release to keep workers busy
  - Borrowing parts from one work order to fill another
- To reduce inventory, the policies and measurements must be in alignment to compensate for known process uncertainty

We Need to Keep Inventories High



You Shouldn't Have too Much

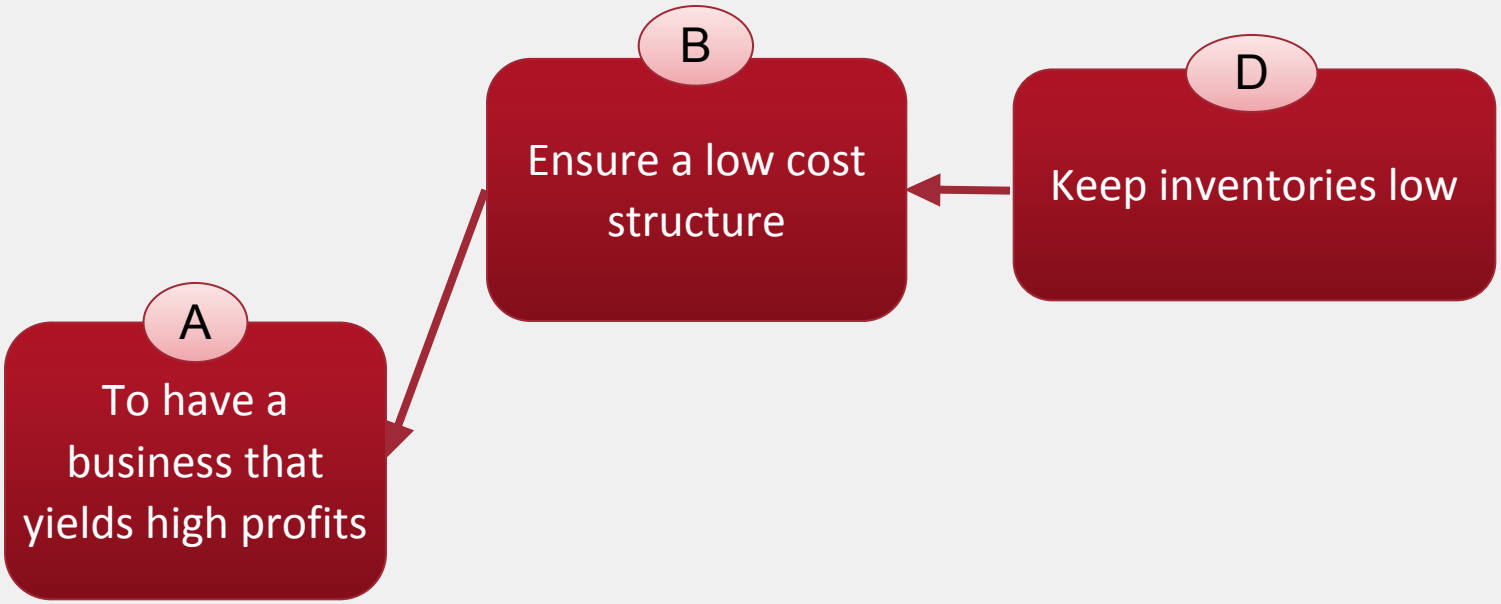
Cost Impact

- Capital / cash flow
- Space & storage
- Movement
- Obsolescence
- Engineering change rework
- Loss and damage

Throughput Impact

- Clogs production pipeline: increasing lead times & cash cycle
- Creates opportunity to work on the "wrong" sequences
- Stealing consumes parts needed, creating artificial shortages

We Need to Keep Inventories Low



You Shouldn't Have too Little

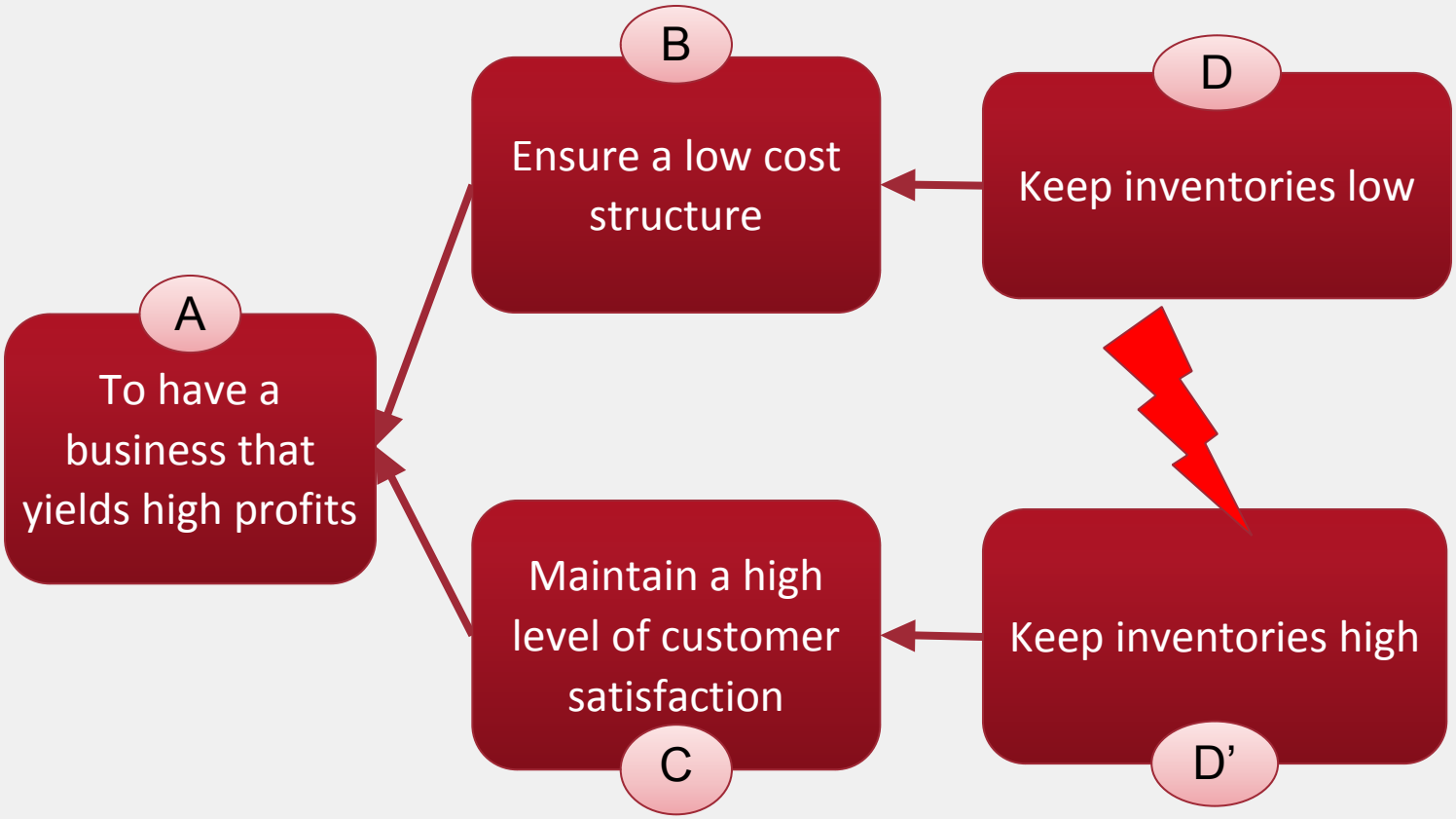
Cost Impact

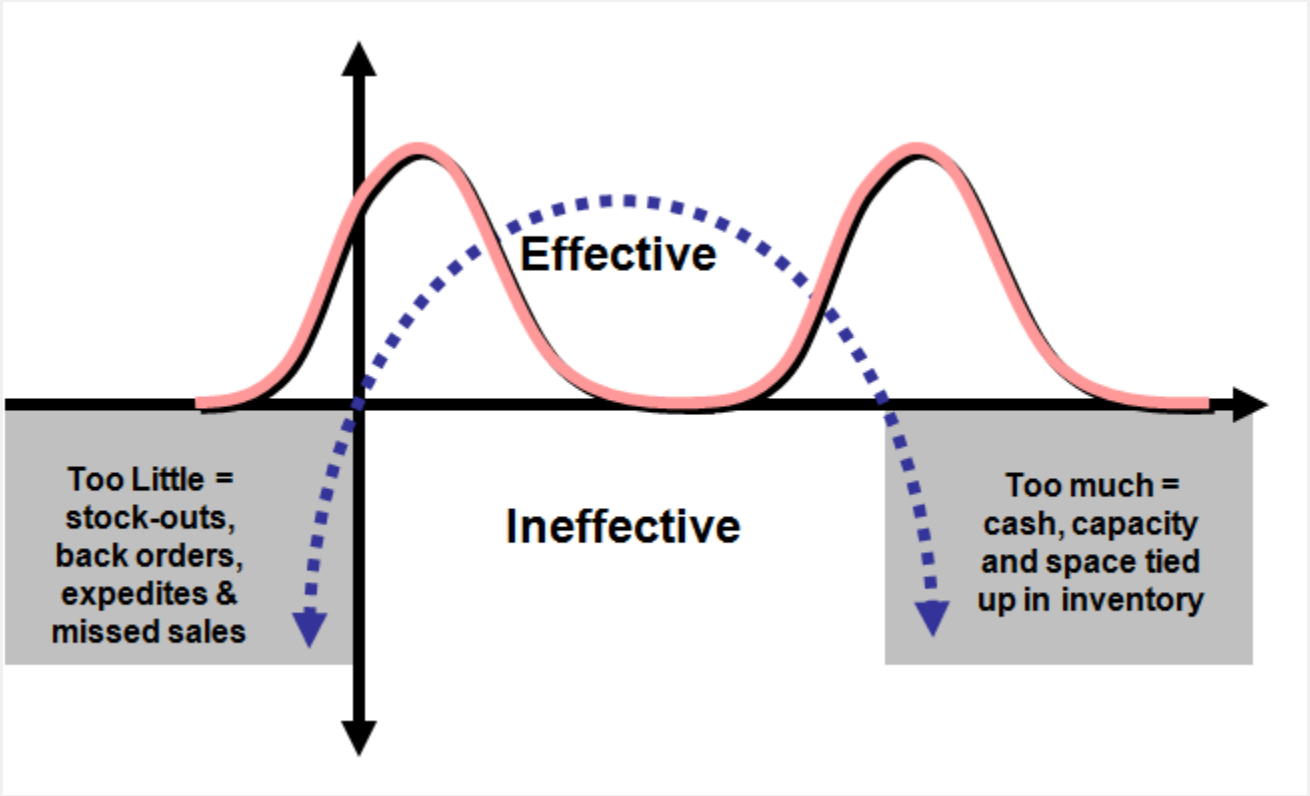
- Expensive part substitutions
- Expediting to "catch up"
- Premium freight inbound and outbound

Throughput Impact

- Partially finished units in WIP hold components that could be shipped
- Production delays – late shipments
- Lost or delayed revenue

We Have a Problem!

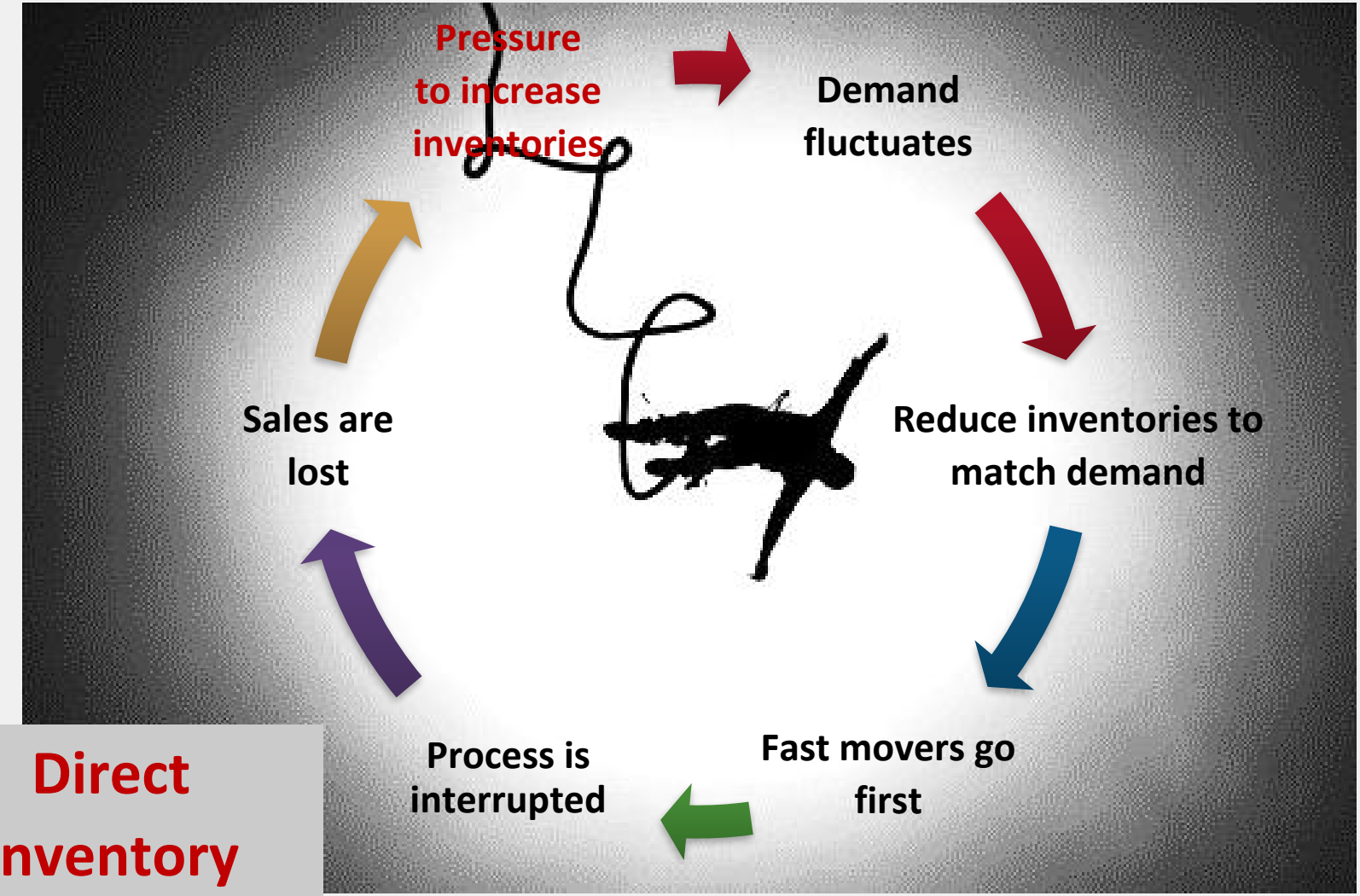



Effective
Too Little = stock-outs, back orders, expedites & missed sales
Ineffective
Too much = cash, capacity and space tied up in inventory

The Traditional Solution…

Keep inventories high until the pressure on cash or expenses is too great

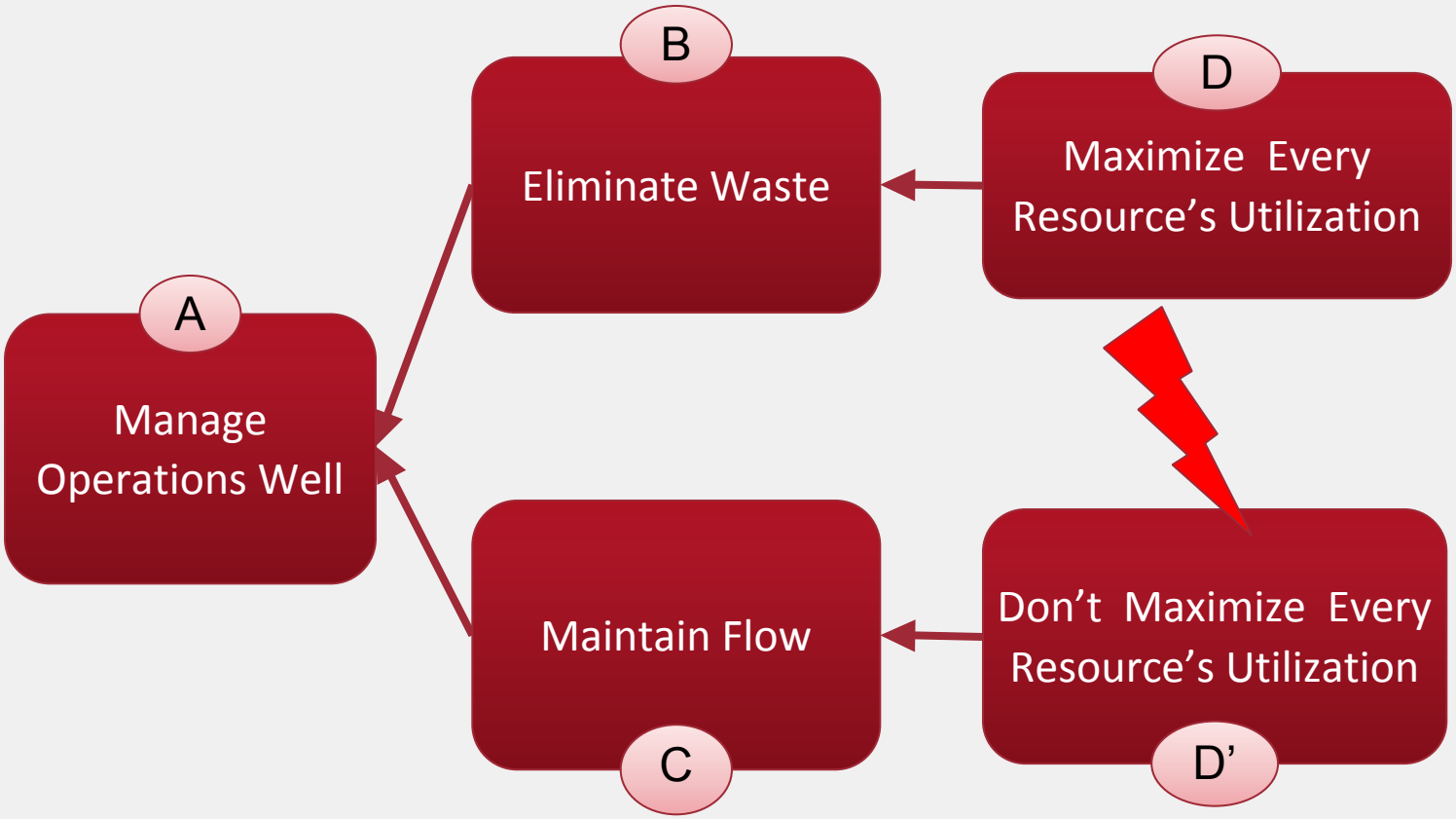
...Creates a Yo-Yo-Effect...



Direct Inventory Management

…With Negative Side Effects

Operations' Dilemma



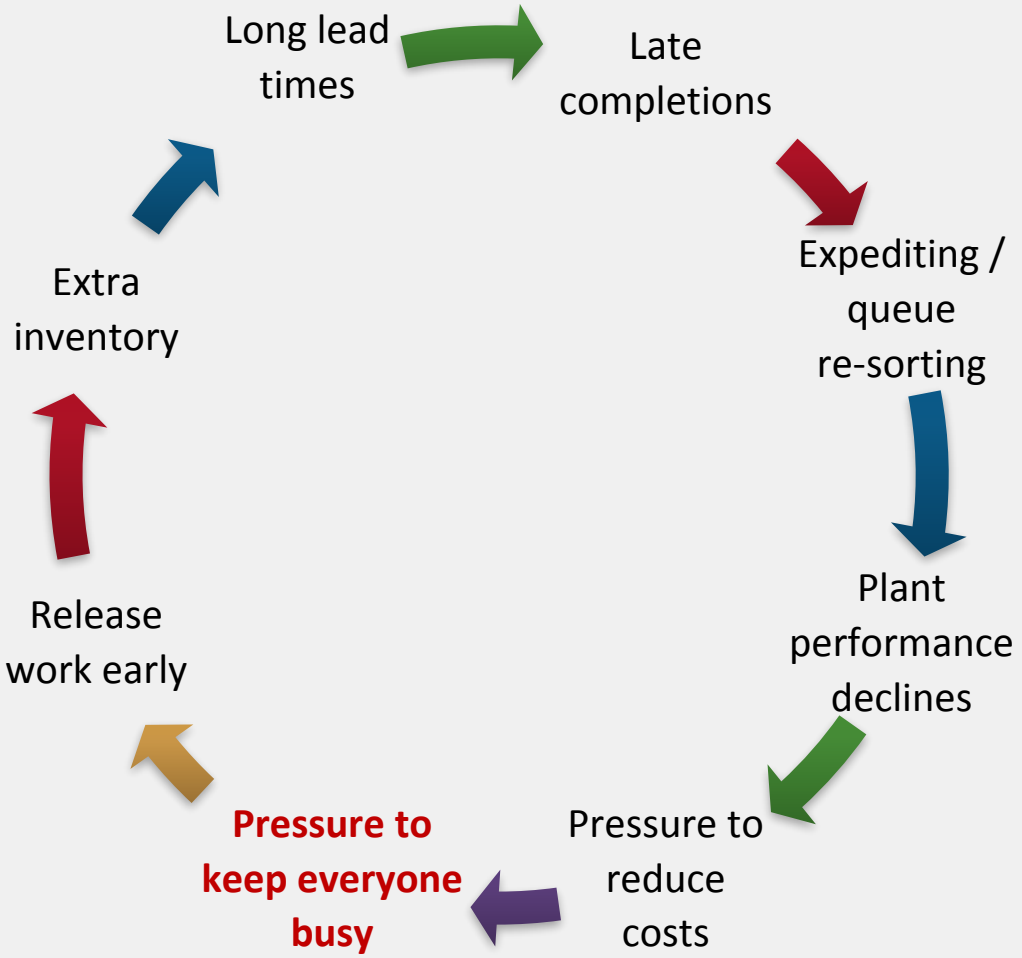
No matter what you do with your resources, you cannot win.

The Traditional Solution

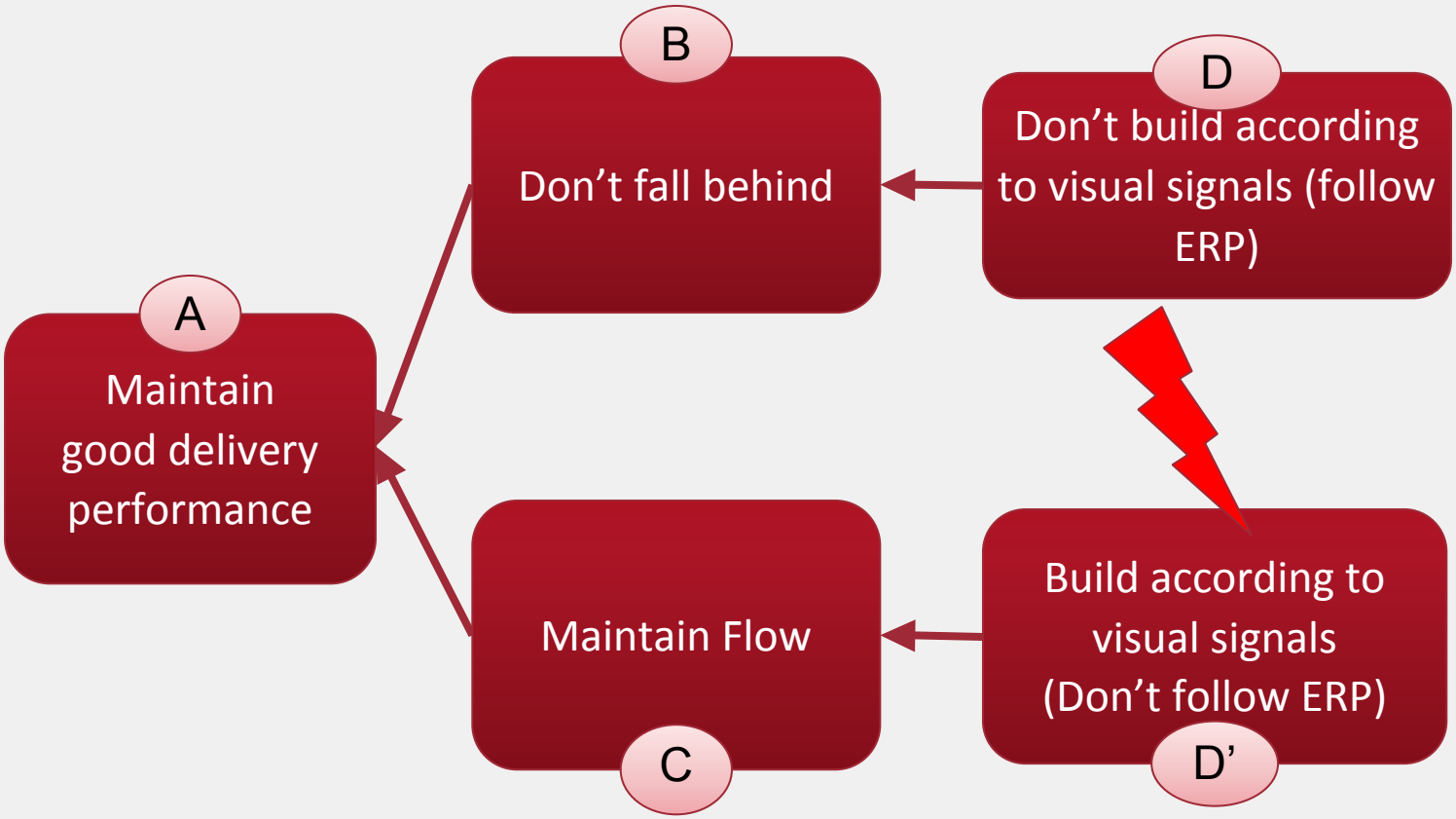
Maximize every resource's utilization except for urgent orders

What most organizations do is try to maximize efficiency, but if something is urgent, they override the policy by expediting and adding overtime to catch up.

Efficiency Creates More Inventory

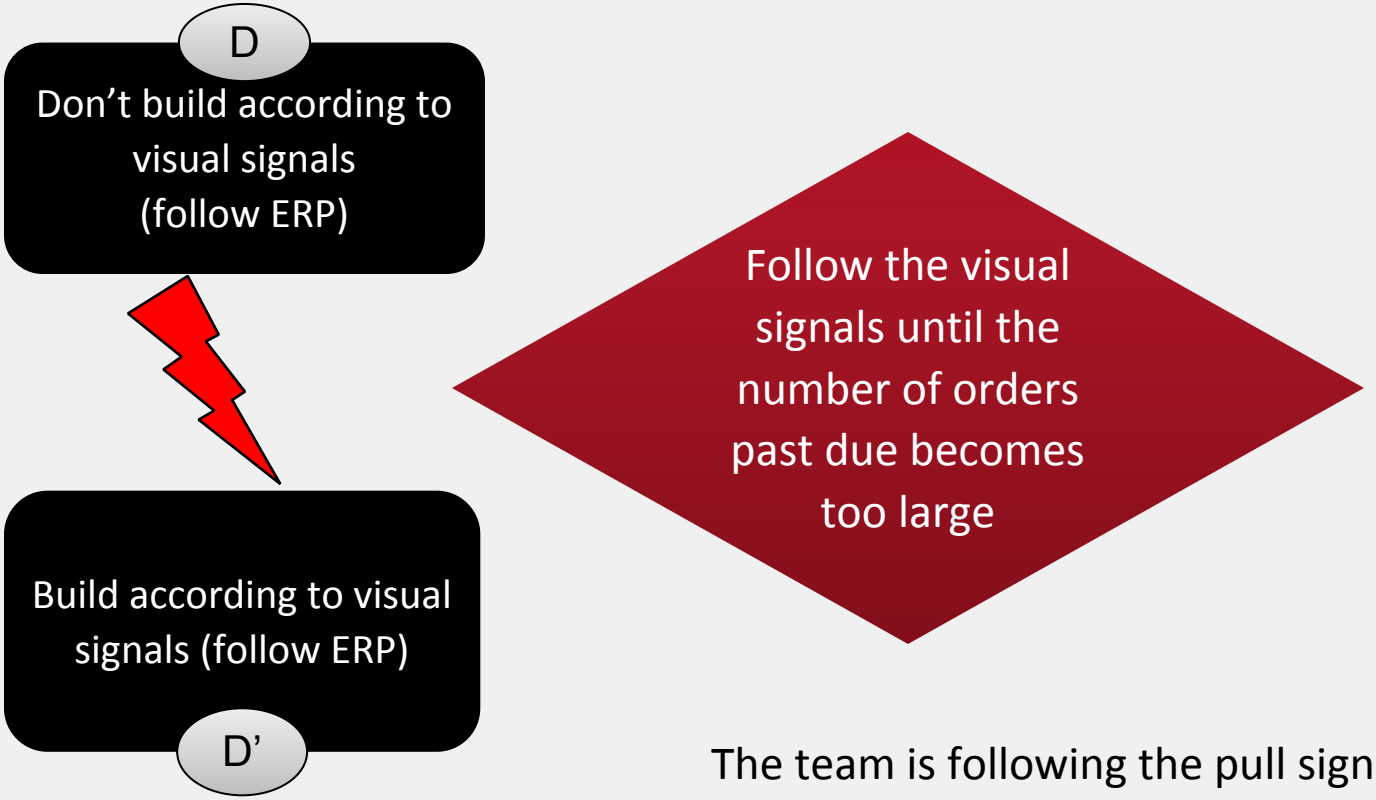


The Planner's Dilemma



No matter what you do with your workflow, you can't win

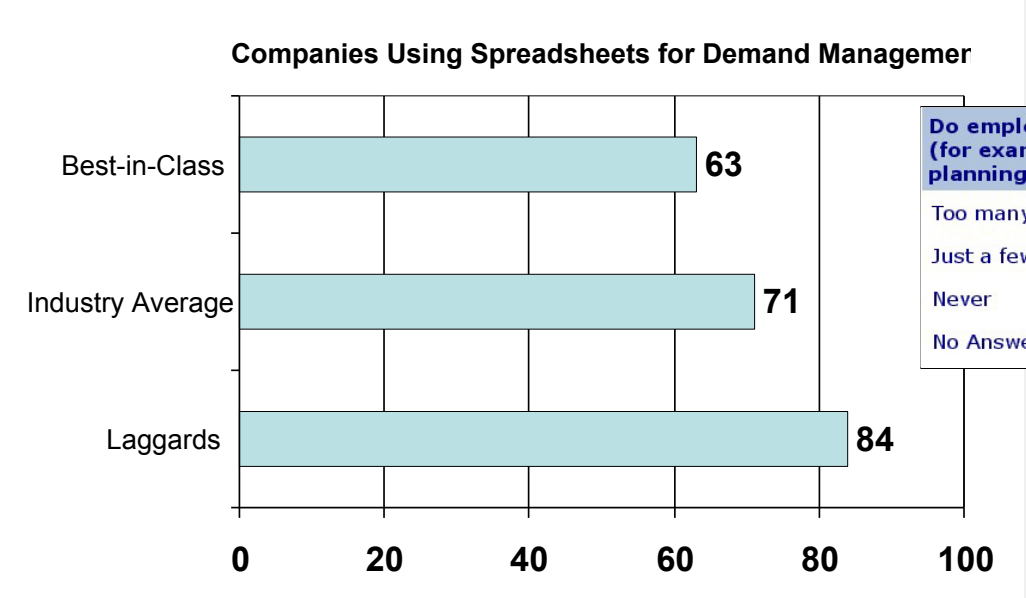
The Conventional Solution



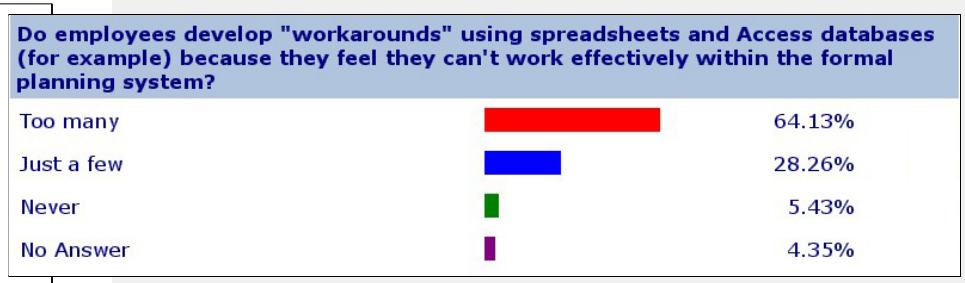
The team is following the pull signals, but being forced to work on product that is not dictated by the immediate demand

Manual Work-Arounds

- Excel® sheets and Access® based mini-systems



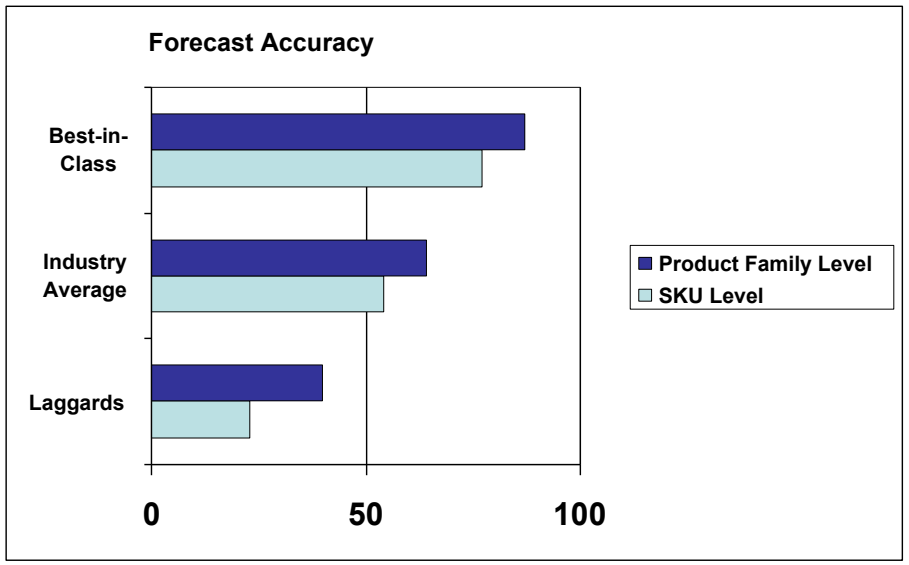
Aberdeen Group (Demand Management, November, 2009)



Online Survey by www.beyondmrp.com (2008)

Better Forecasting

- Forecast accuracy is declining
- Complex BoMs are more susceptible to error
- Push-based tactic



Aberdeen Group (Demand Management, November, 2009)

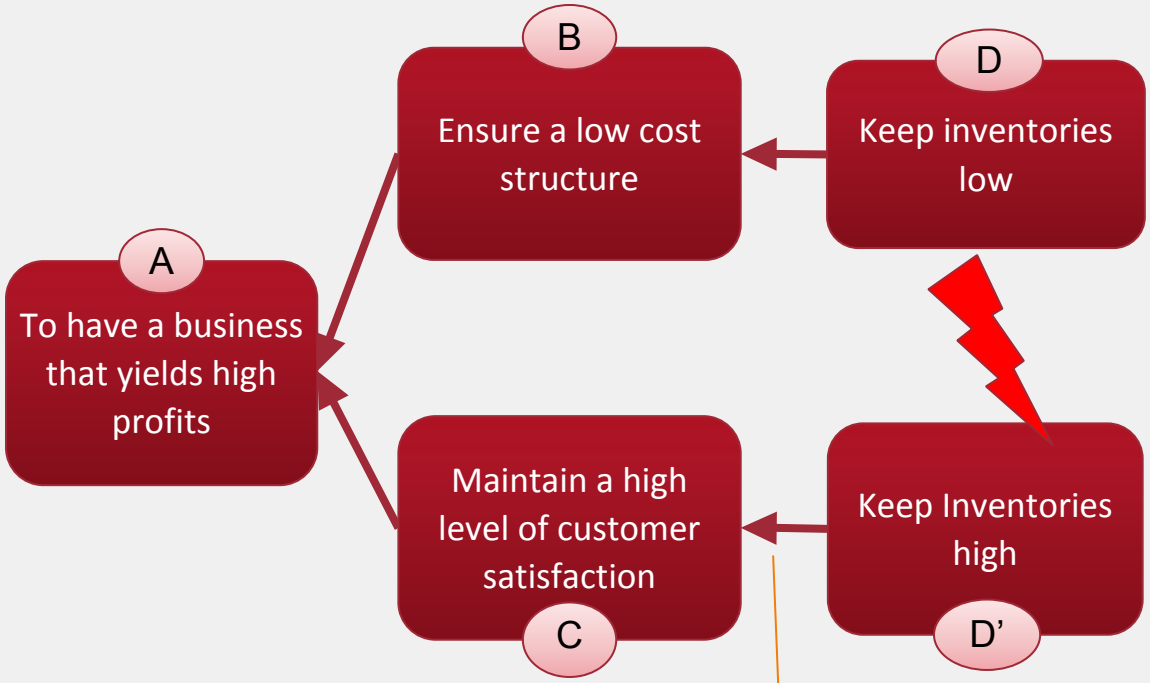
"Metrics or planning methods grounded in past occurrences are like driving your automobile by looking in the rear view mirror. This focus may not help in determining what will occur in the future across channels and market segment, or adequately support a more demand-driven environment."

Cambashi, Inc. October 2009. "Managing Extreme Volatility, Variability and Variety" Cummaquid, MA: Cambashi, Inc., project reference U2934

Manual Re-order Points

- Kanbans and supermarkets become unmanageable in environments with thousands of components
- Rarely adjusted
- No netting – requires inventory everywhere
- No available stock picture
- Not responsive to swings in demand

Why Haven't We Resolved the Inventory Conflict?

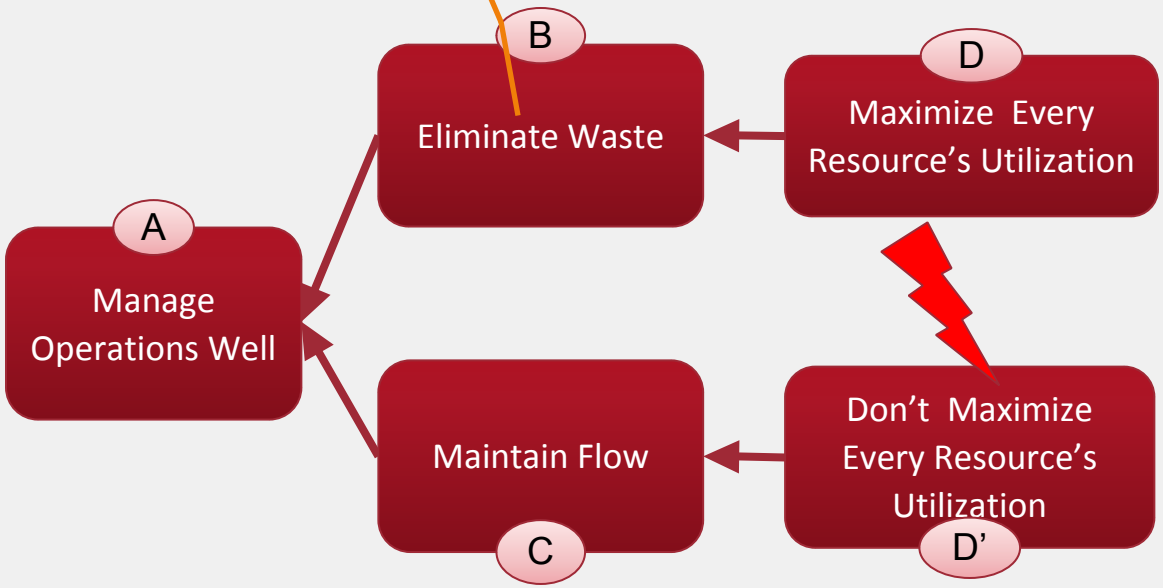


Replenishment time is long & unreliable

Demand cannot be accurately predicted

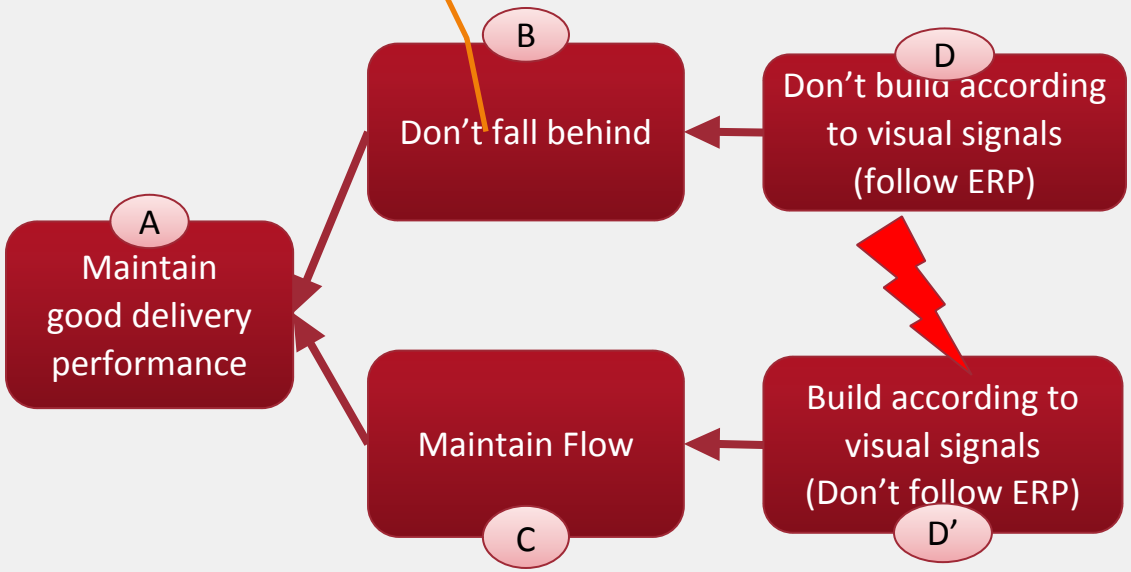
Why Haven't We Resolved the Operations Conflict?

If workers are not building something, we're wasting money

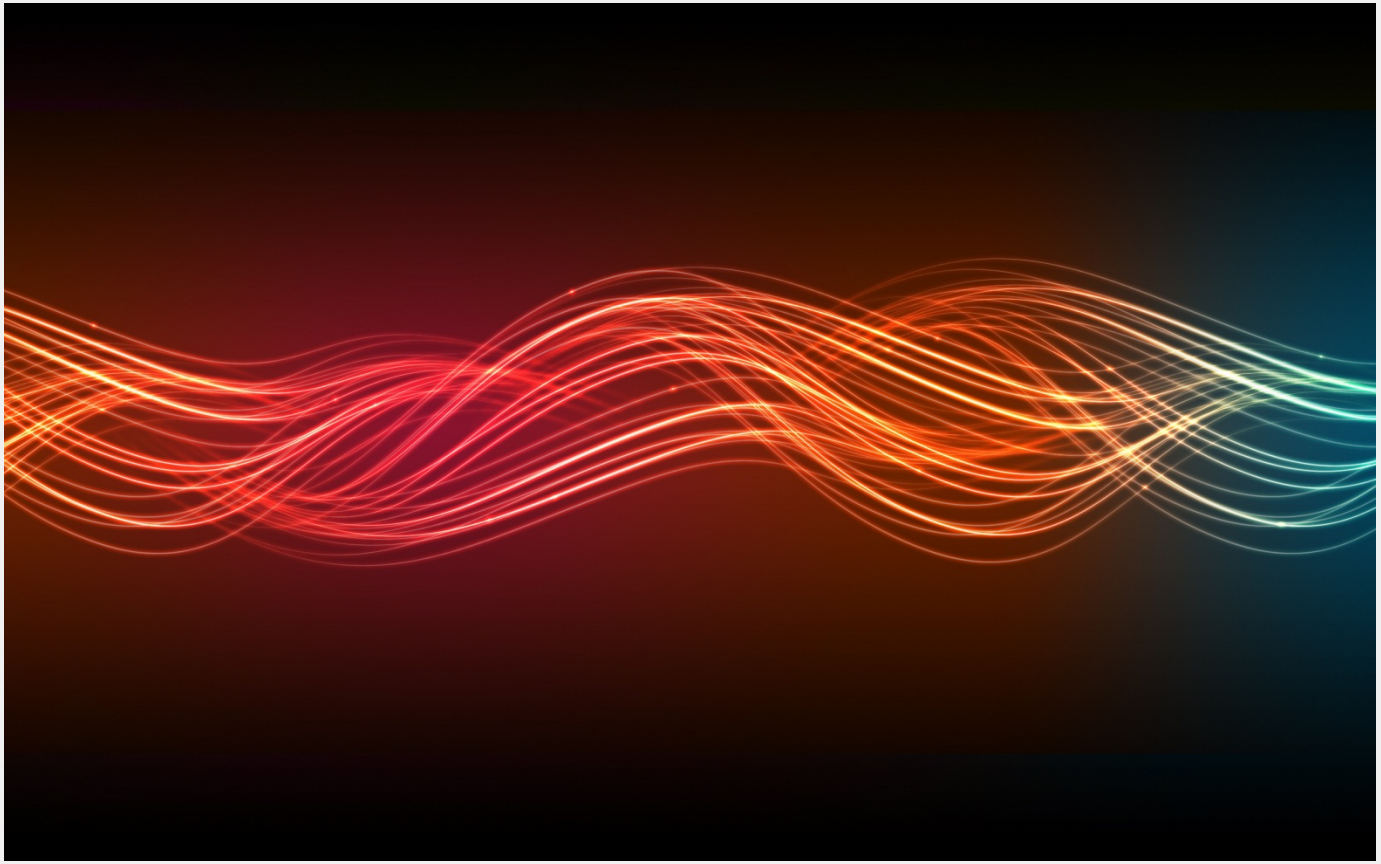


Why Haven't We Resolved the Planner's Conflict?

ERP work order due dates paint an accurate picture of the position of the operation



Objective: FLOW



How to Create a System without Conflict?

- Focus on the processes that create inventory
- Break the rules that don't work
- Create new rules
- Realign organizational behavior to flow
  - Measurements
  - Behavior
  - Policy
  - Process
  - Accountability

Objectives for Solution

- Reduce inventory requirements significantly
- Reduce build lead time significantly
- Improve execution capabilities and performance

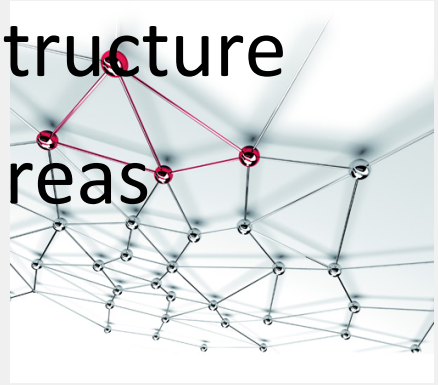
Solution Building Blocks

- ERP Formal & Shop Floor Informal Systems Synchronized
  - Synchronous flow using strategic constraint
  - Demand-Pull Replenishment
  - Master Scheduling linked to execution
- Measurements based on flow
  - Buffer penetration
  - Inventory & Throughput Dollar Days
- Inventory strategies dictated by process
  - Consumption based order polices
  - Buffer management
  - Active synchronization

Strategic Inventory Positioning

A function of:

- Customer Tolerance Time (CTT)
- Variable Rate of Demand
- Variable Rate of Key Sources of Supply
- Inventory Flexibility and Product Structure
- Protection of critical operational areas

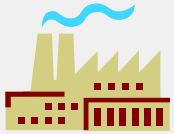


Choose Appropriate Parts for Buffering

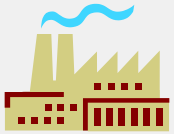
Purchasing

Critical and long lead time parts and even some critical NON-Stocked parts

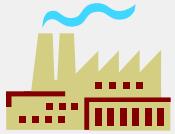
Supplier 1



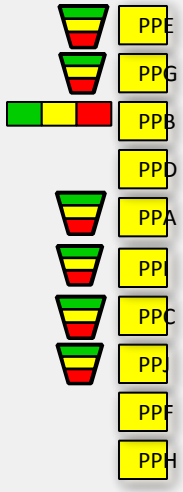
Supplier 2



Supplier 3

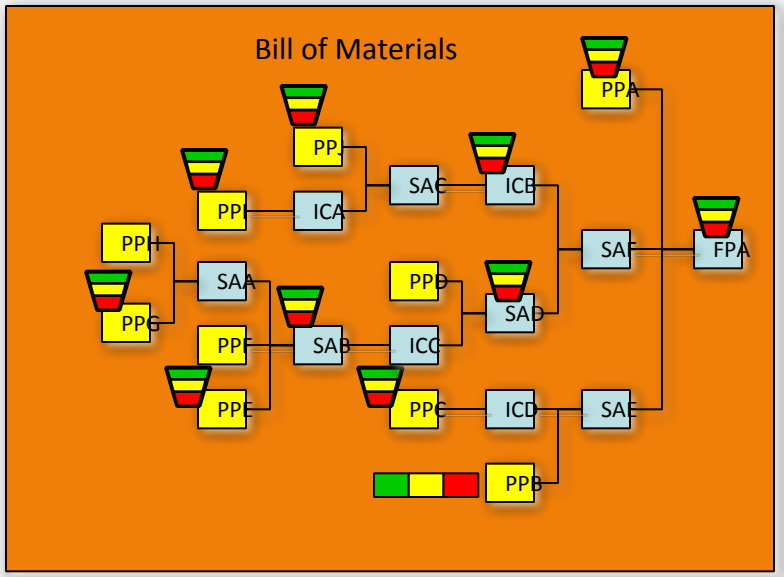


Purchased Parts List



Operations

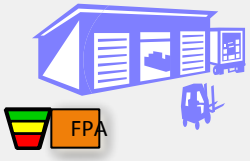
Critical manufactured parts, sub-assemblies and finished stock



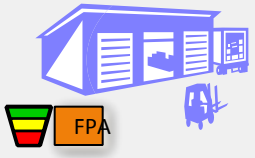
Fulfillment

Finished stock

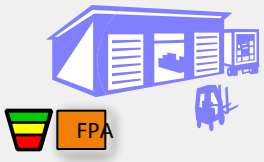
Region 1



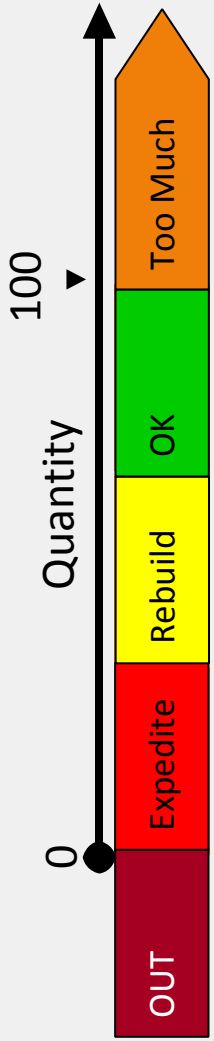
Region 2



Region 3

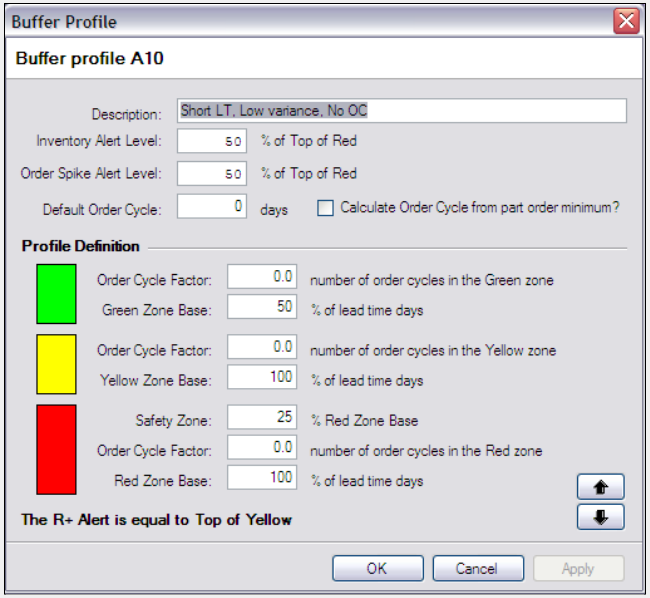


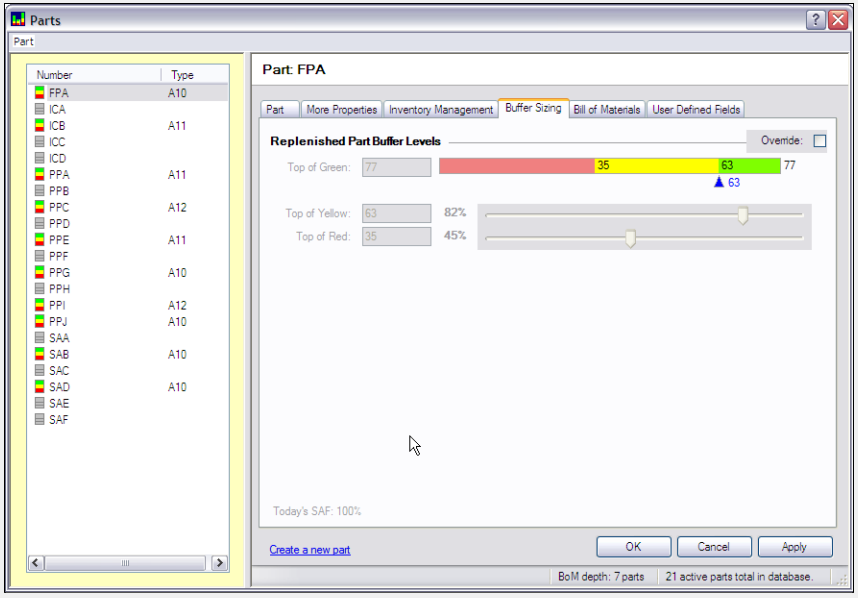
Buffer Zoning



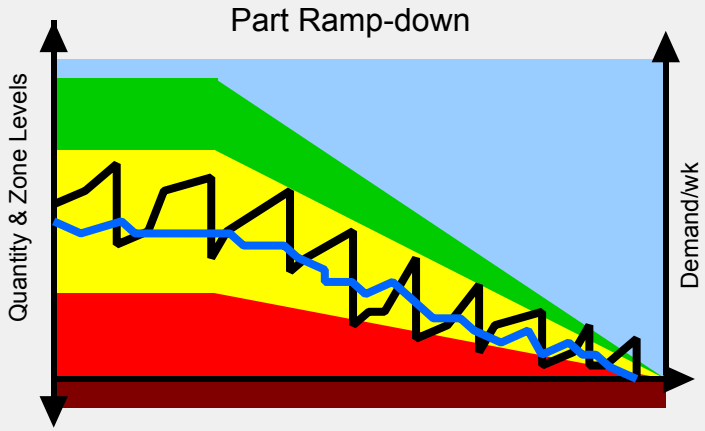
- Buffers are sized based on part characteristics
- Chosen Part buffers will be managed based on an intuitive color coding system.
- Buffers have 5 zone statuses. (Too much, Green, Yellow, Red, Out)
- The zones create visible priority for planning AND execution.

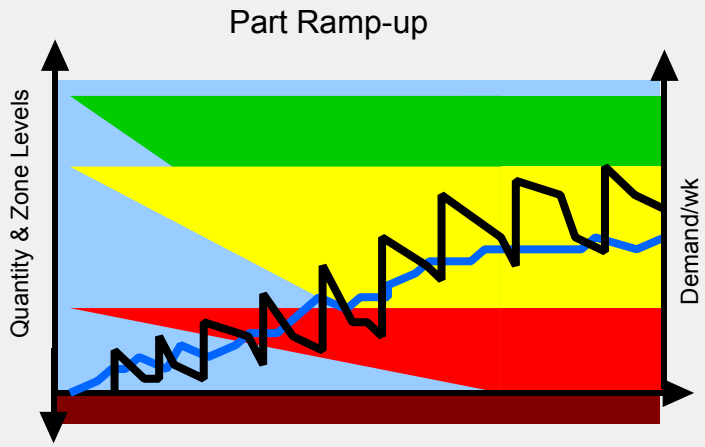
Group and Individual Part Buffer Settings

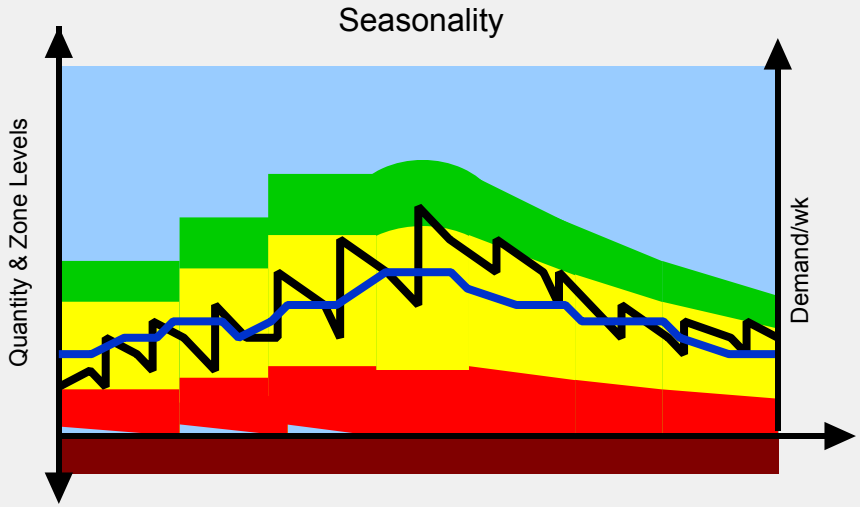




Dynamic Buffer Adjustment

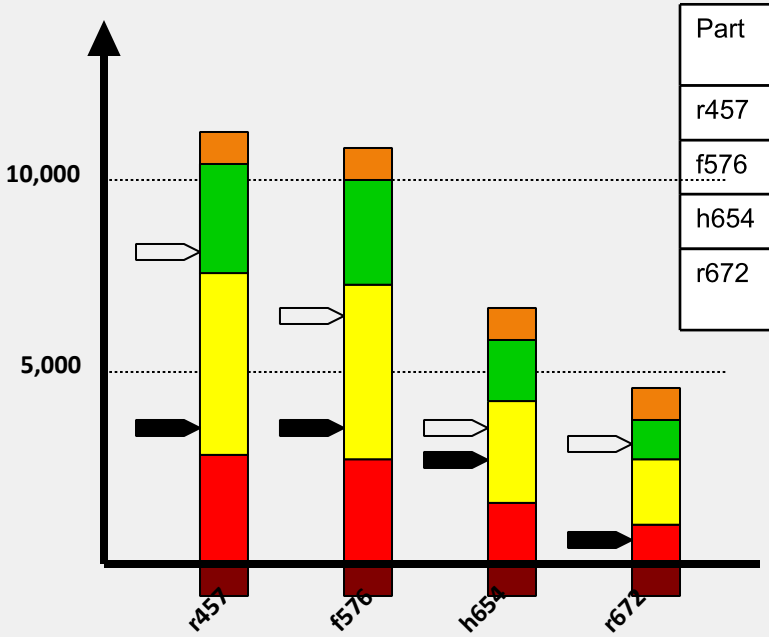






Supply Generation

Supply generation is based on what zone the available stock equation places the part



Part	Open Supply	On-hand	Demand	Available Stock	Recommended Supply Qty	Action
r457	5453	4012	1200	8265	0	No Action
f576	3358	4054	540	6872	3128	Place New Order
h654	530	3721	213	4038	2162	Place New Order
r672	2743	1732	623	3852	0	Expedite Open Supply (Execution)

True pull-based signal with open supply, on-hand, any unfulfilled demand and qualified spikes factored in

Supply Generation

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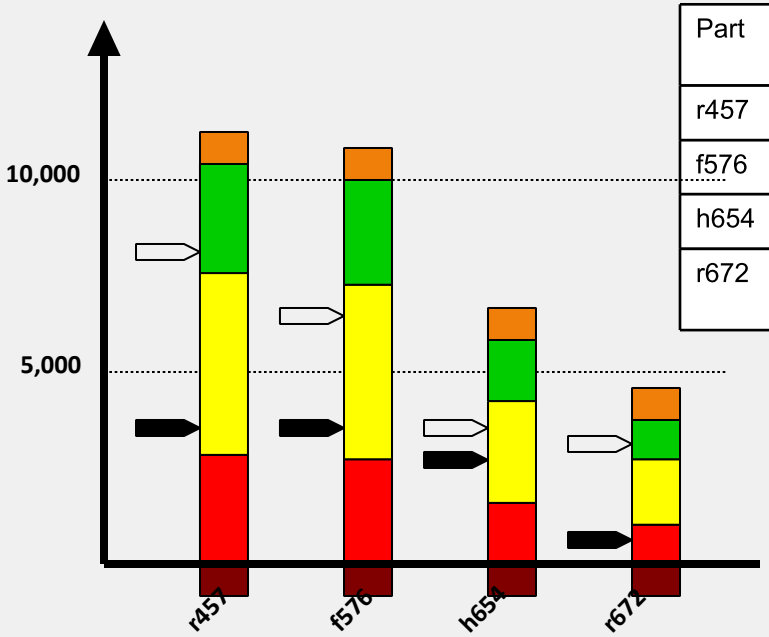

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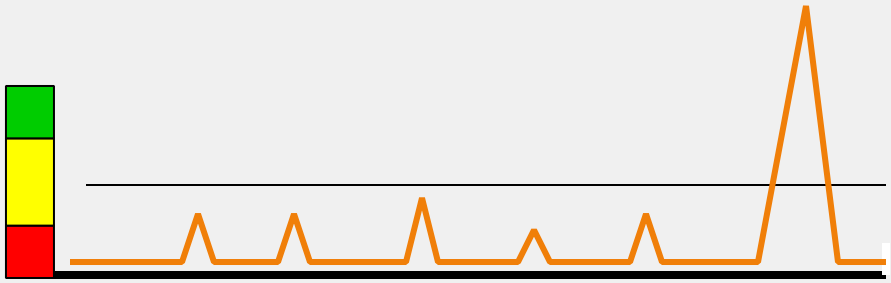
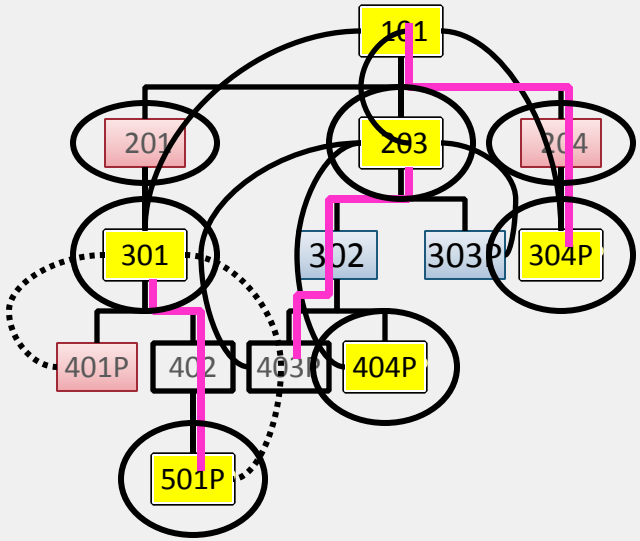


Order Spike Horizon

True pull-based signal with open supply, on-hand, any unfulfilled demand and qualified spikes factored in

Realistic Lead Times

- Most MRP recognizes two types of lead time (Mfg LT and PurLT) – both are unrealistic in most scenarios
- R+® de-couples the Bill of Material at all stock positions. It stops the explosion through each leg when it hits a "stock buffer" position.
- R+® uses the *longest unprotected leg* ("ASR lead time") to:
  - Determine the part's buffer size.
  - Generate the realistic due date for the replenishment of the part.



This means that independent planning, purchasing and scheduling with more realistic lead times will occur between these buffered parts in the BoM.

What it Looks Like Conceptually

Purchasing

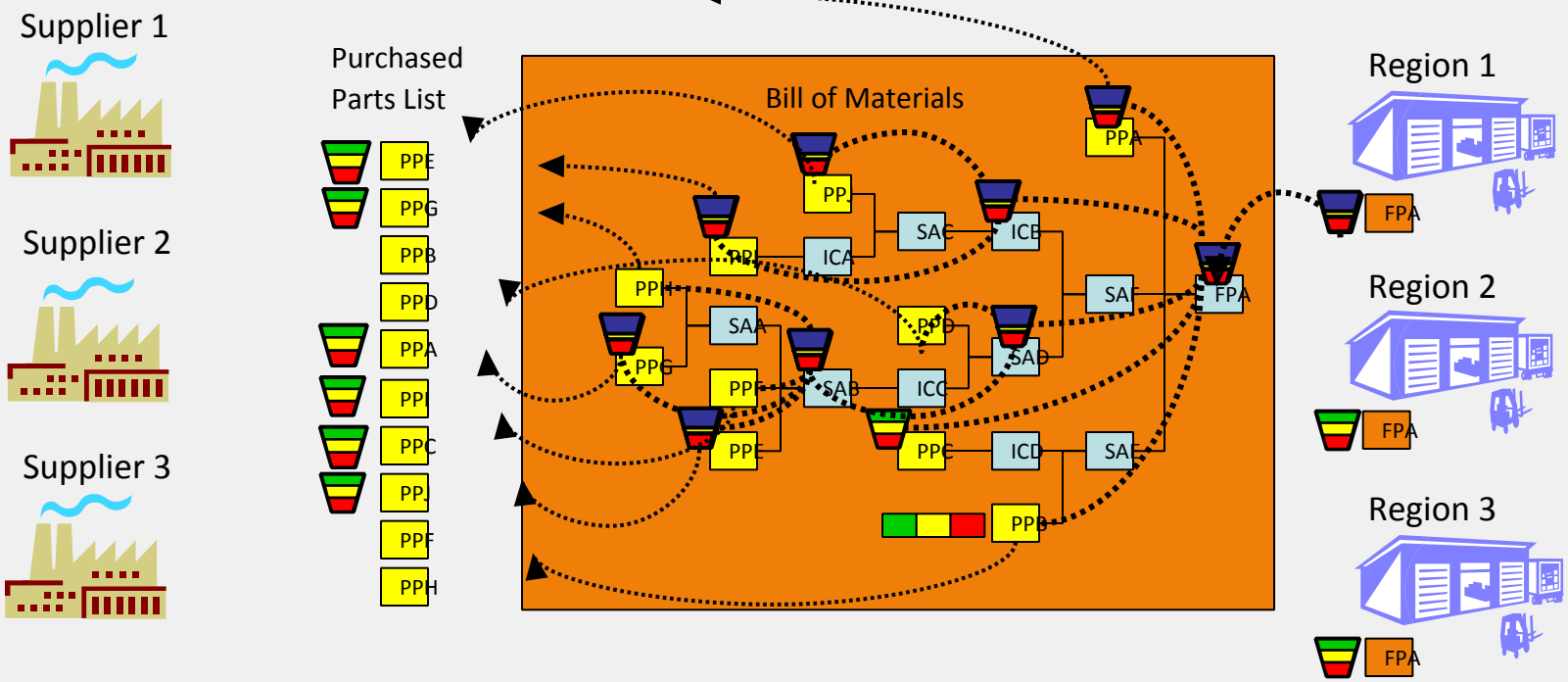
Critical and long lead time parts.

Manufacturing

Critical manufactured parts, sub-assemblies and finished stock.

Fulfillment

Finished stock.



What Execution Looks Like

Purchased Items

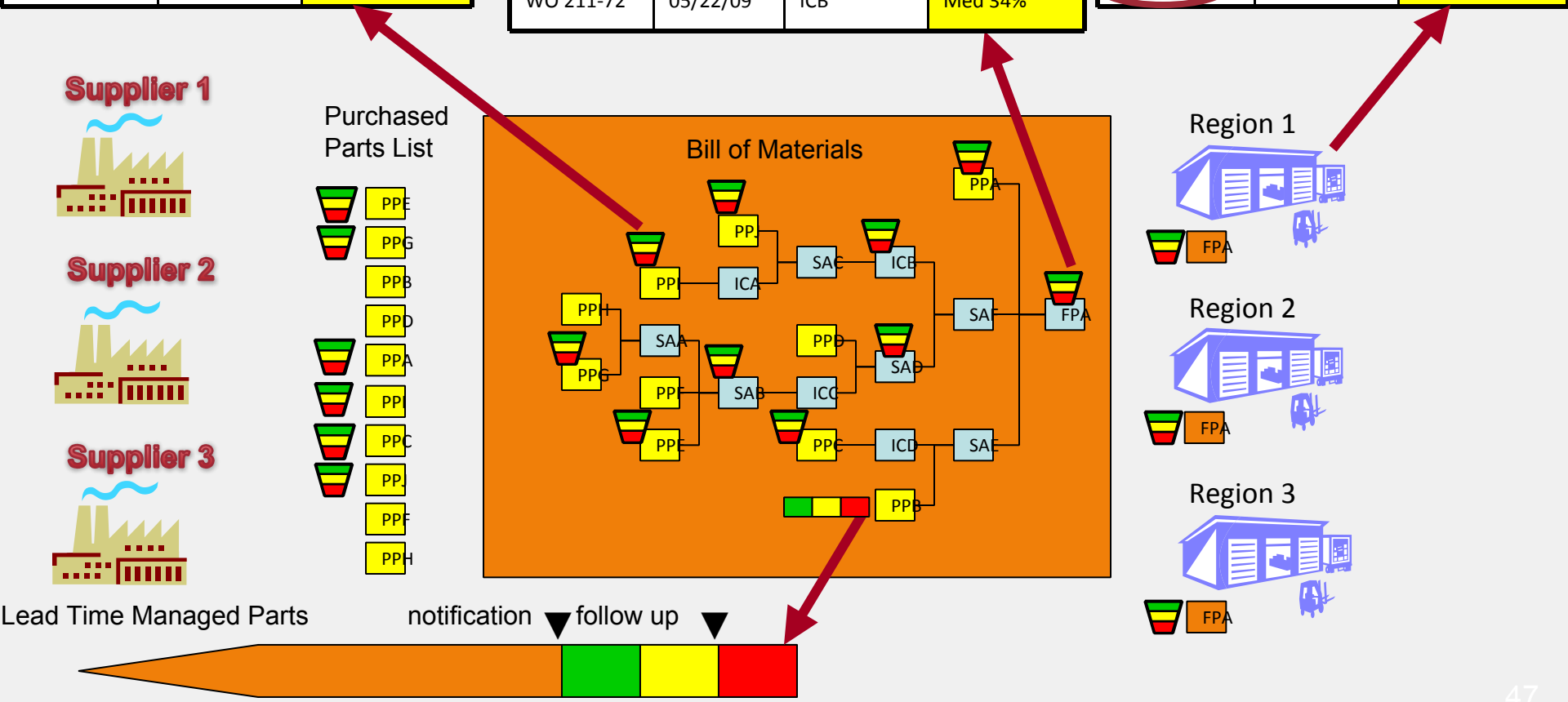
Order #	Due Date	Buffer Status
PO 820-89	05/12/09	Critical 13%
PO 891-84	05/12/09	Med 39%
PO 276-54	05/12/09	Med 41%

Manufactured Items

Order #	Due Date	Item #	Buffer Status
WO 819-87	05/24/09	FPA	Critical 13%
WO 832-41	05/22/09	SAD	Critical 17%
WO 211-72	05/22/09	ICB	Med 34%

Distributed Items

Item #	Location	Buffer Status
FPA	Region 1	Critical 11%
FPA	Region 2	Med 41%
FPA	Region 3	Med 36%



Solution Criteria Check

- Produces results quickly.
- Improves return on working capital.
- Low risk.
- No compromise on your quality, safety or customer service.

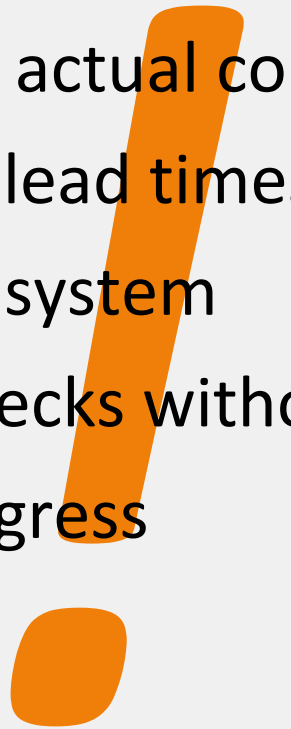
Demand-Pull in Action (1/3)

- Parts production unit of a worldwide manufacturer of commercial and military airplane assemblies and components
- 4 years worth of orders placed
- >30,000 SKUs
- Issues:
  - fill rate shortfalls
  - missed service deadlines
  - excessive overtime

Situation

Demand-Pull in Action (2/3)

- Pinnacle Strategies implements Supply Chain Solution with Demand-Pull principles:
  - Replenish to actual consumption
  - Reconfigure lead times and batch sizes
  - One priority system
  - Bust bottlenecks without investment (“RABIT”)
  - Monitor progress



Solution

Demand-Pull in Action (3/3)

Cost Impact

- USD 2.8 mio overtime saved
- Internal fill rate rose from 85% to 99%

Throughput Impact

- Inventory turns: +83%
- Past due orders down by 93%

And:
Recovery after a tornado hit without any missed delivery!

Results

Implementation

Snap Shot

- Concepts briefing (1hr)
- Data collection & analysis
- Summary with and without planning support for:
  - Days out of stock
  - Inventory levels (quantity and %)
  - Availability (service level %)
  - Fill rate %

1d

Design & Modeling

- Building operational model
- Concepts briefing
- Snapshot analysis

2d

Rehearsal & Go Live

- Ramp up briefing
- Planning screens
- Execution screens
- Continuous improvement process:
  - Project management support
  - On-going daily / weekly support

2d

Become Demand-Pull Driven

If reality is in the driver's seat…

- **Procurement, production, and distribution are demand-driven**
- **Supply chain performance is stable, goods are flowing**
- **Decision making is based on facts and decisions are rational**
- **Customer service improves**
- **Cost and investment decrease significantly**
- **High performance chain and links**

The Offer

- "Snap Shot"Analysis (1 day)
  - One hour concepts briefing
  - Analysis
    - Collect usage and balance data & cleanse
    - Generate analysis
    - Present summary with and without planning support for:
      - Days out of stock
      - Inventory levels (quantity and %)
      - Availability (service level %)
      - Fill rate %
  - Report-out
  - T&E for two people

Proposal Elements

- Summarize problems, solution and high level implementation
- ROI based on reduced inventory and increased service level
- Fees based on current inventory position and predicted savings
- Fees paid monthly

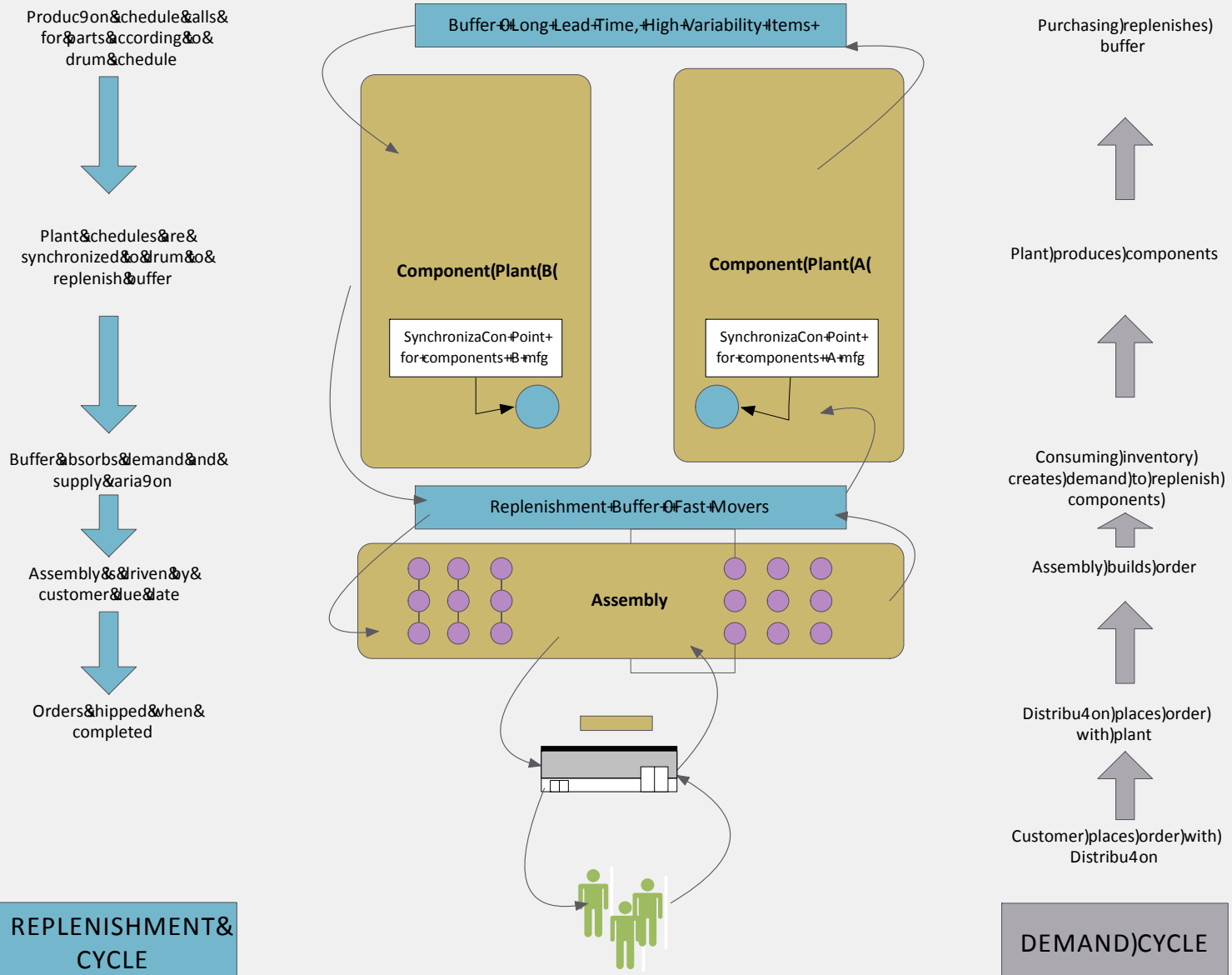
Design & Modeling (2 days)

- Concepts briefing
- Snapshot analysis
- Rehearsal & Go Live steps

Rehearsal & Go Live (2 days)

- Ramp up briefing
- Planning screens
- Execution screens
- Continuous improvement process
  - Project management support
  - On-going daily / weekly support

Demand-Pull Process Overview



Thank You – Tussen Takk

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