PLANNING FOUNDATIONS

Part II: The How and Why of Inefficiencies in Supply Plans

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In a series of posts I will outline that despite the current digitilization hype end-to-end supply planning models still struggle to be agile and responsive. I will describe what is currently happening in these supply models, how this happens and why. Finally, I will highlight the opportunities of a new end-to-end supply planning framework. One that does connect all end-to-end planning processes, has single accountabilities, centrally controlled by supply parameters to ensure seamless product flow.

In my last post I described what is happening in today's supply models. In this article I outline how and why many of the existing end-to-end frameworks struggle to achieve basic objectives:

- Central & regional control of target service level fulfilment
- Stabilization of manufacturing assets to reduce upstream variability
- Stable supply signals to optimize component supply and inventories that reduce the bullwhip effect
- Improvement of COGS (costs of goods sold) along connected supply nodes
- Tactial control of service capabilities of a supply chain

Part II - How do these inefficiencies take place in supply planning and why is this happening along the supply chain?

Despite many inefficiencies along the supply chain, today's supply planning operating models are often controlled and driven by aggregated rough cut/ master plans. Central functions struggle to gain transparency on the supply capability such as visibility of the true inventory positions, capacity profiles, etc. to evaluate tactically performance metrics such as inventory costs and service level targets in a sales and operations planning process.

Conceptually, in supply planning not much has changed for the last years despite of costly process refinements, process oriented organizations, and advanced planning technology implementations. Still, material requirements planning (MRP) propagates demands and routes it across the supplying nodes not reflecting the true supply capabilities, tactically. The results are often operational emergencies, and protectionism of the short term plans.

It is interesting that supply chain professionals still refer to a tactical plan as rough cut plan or master plan. While it seems correct that aggregated tactical plans based on average lead times might be sufficient to gain visibility on available and required capacity and materials to reduce complexity. It is however quite a challenge to determine appropriate average lead times to reflect an appropriate material and capacity constraint plan. Observations have shown that for instance in machine changeover intensive manufacturing environments the difference to an average setup time to the actual setup dependent change over time is often up to 50%.

Thus, assuming the wrong average lead times in combination with aggregated or bucketed capacity, supply plans have a significant impact end-to-end. Along the supply nodes, period by period a plan may seem sufficient. However, once it is rolling into the operational horizon the disaggregation of

a plan necessary to schedule a factory can have significant lead time effects. These lead time affects are often driven by change-over times, commercial customer prioritizations, operational inefficiency, etc.

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All of a sudden what seemed to be feasible and in sync tactically isn't any more operationally. An aggregated, bucketed master plan for instance may assume the average machine setup time for a particular product or product portfolio. Once the aggregated plan transitions into the operational time horizon a master plan becomes disaggregated into a production schedule. To protect the operational plan the tactical plan becomes separated quite commonly by a work in process basket where prioritized orders are pulled into the operational horizon by a planner/ scheduler or from the operational zone back into the work in process basket, again because of re-prioritizations. This work basket is also in many industry environments characterized by a bow wave at the end of the operational period, the freeze period. The disaggregation is reflected by scheduling with detailed start and end times and actual setup times based on the predecessor successor product relationships. Also customer prioritizations due to short term demand changes become predominant. In the end the order lead time increases. This often leads to a situation where the capacity in the operational horizon is not sufficient and a re-prioritization of the production orders is initiated.

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A vicious circle is created. While a tactical plan is re-created based on its MRP planning frequency, an operational plan becomes completely decoupled from its tactical horizon. The short term, operational horizon is now characterized by constant re-prioritization based on first come first serve, component, machine and labor availability. Short term it regularly seems that the available capacity is not enough to fulfill the demand. Constant changes on a manufacturing line lead to line availability issues. Capacity availability becomes a challenge. From an end-to-end supply planning point of view functional silos are created supply node by supply node constantly firefighting.

Overall, short term changes of a schedule lead to noise and variability along the supplying nodes. This is caused by re-planning/ re-scheduling of a nodes plan to accommodate changes in the demand situation. The operational planning window gets tight capacity wise, backlogs occur, orders are waiting and queuing outside the operational fulfilment horizon. Operational plan stability becomes a necessity but the means towards it is often realized by an operational protectionism, by artificially firming plans. Tactical and operational plans become two entities where the rough cut/ master plan seem to be infeasible. End-to-end plans get out of sync and key components are short which interrupts production further and leads to re-planning affecting the tactical horizon. As a result buffers are increased. Lead time buffers, capacity buffers or inventory buffers to keep service level targets but negatively affecting costs of goods sold (COGS).

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In summary, in today's supply models the supply capabilities are not adequately reflected leading to supply variations and service level violations. Aggregated and bucketed master plans with difficult to determine average lead times promote the bullwhip effect. Observations have shown that lead times can vary from a tactical to an operational plan by up to 50% on individual order level. A master plan is not able to lay out a synchronized material flow constrained by available capacity tactically into the future because the short term events bring a plan constantly out of sync.

Limited organizational supply planning capabilities without local and global end-to-end accountabilities lead to infeasible and misaligned supply plans. Today's rough cut/ master plans are not designed to parameterize a supply plan end-to-end by constantly calibrating inventory buffers to stabilize manufacturing. As a consequence the organizational supply planning operating models are not enabled to calibrate a supply chain centrally by using supply planning parameters. Tactical rough cut or master planning become not only functionally two entities but also organizationally. Local sites tend to evade into a shadow planning in spreadsheets escaping from the instability that an

MRP based plan entails. This deteriorate the reliability and visibility of a supply plan end-to-end even further. It is not unusual in these type of environments that also tactical planning capabilities of local and global organizations deteriorate because of the lack of credibility of a tactical supply chain plan. This happens because supply shortfalls such as material and capacity constraints are not adequately considered by MRP driven master plans leading to over or understating the supply capabilities across the supply chain.

> ***Have you experienced similar? Please let me know how operational and tactical planning is working in your company.***

In one of the next posts I will outline what are the opportunities to transform an existing supply planning operating model that is characterized by the above outlined behaviors.

Embedded illustrations: Interactive content — Open the original article for this interactive content

Part I of the series: "What is happening in today's end-to-end supply planning models?"

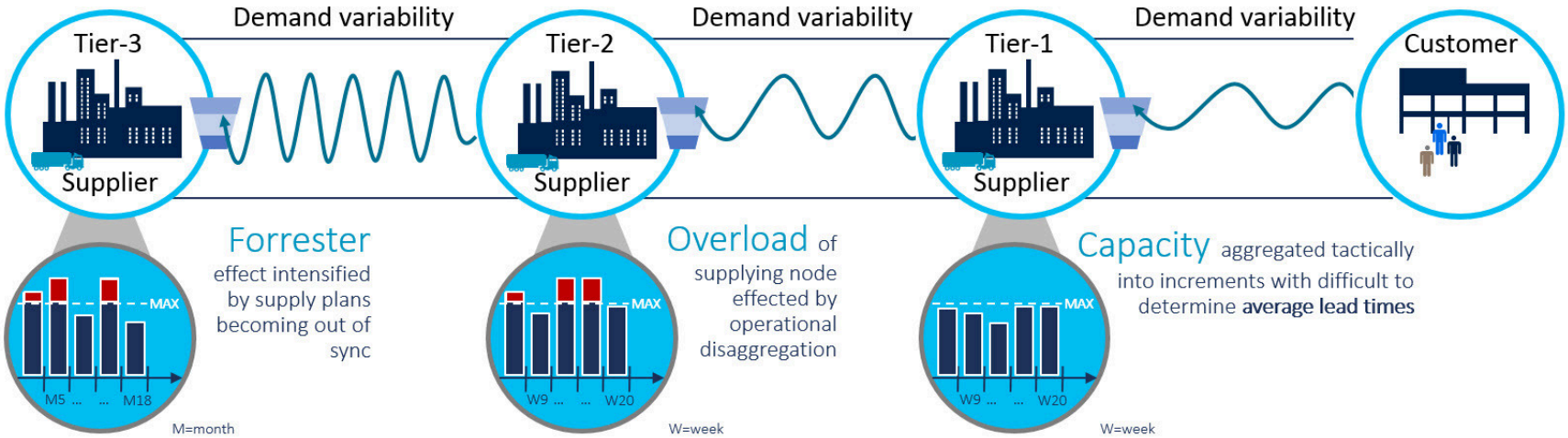
#SupplyPlanning, #MRP, #SupplyChain, #E2EPlanning, #Capacity, #Inventory, #Variability, #Bullwhip, #DDMRP, #DDRWP, #DDSCM

Figure 1

Today's reality

MRP propagated demands are routed across all supplying nodes not reflecting the true supply capabilities tactically leading to operational emergencies and plan protectionism

How is this happening along the supply chain?



Forrester effect intensified by supply plans becoming out of sync

Overload of supplying node effected by operational disaggregation

Capacity aggregated tactically into increments with difficult to determine **average lead times**

Supply capabilities are determined by propagating MRP based **demands aggregated and unconstrained** along the supply chain

End-to-end supply plans get or of sync due to operational **disaggregation of production plans impacted by actual execution lead times** resulting in expediting and backlogs intensifying the Forrester effect and service level violations

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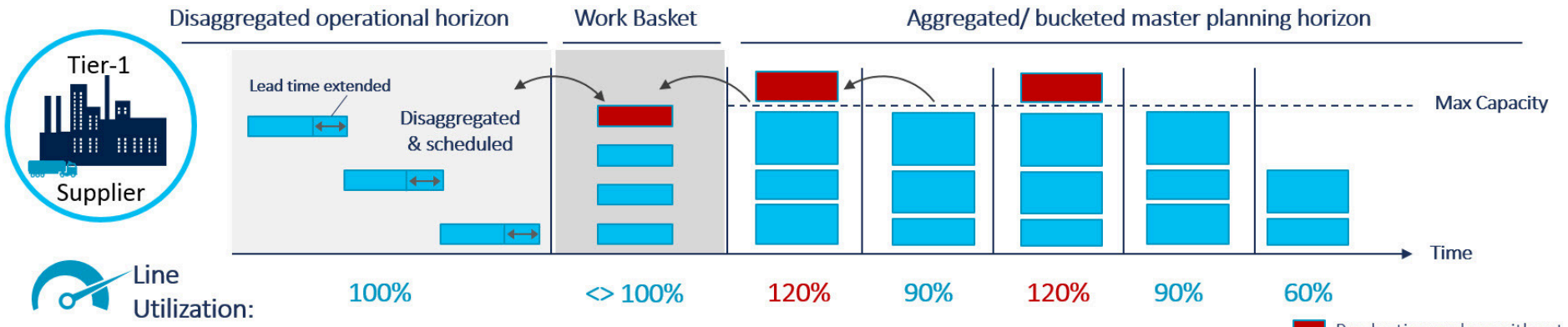
Figure 2

Today's reality

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Today's classical planning situations driven by aggregated master plans lead to constant re-prioritization events operationally destroying flow with a supply chain out of sync

How does an aggregated master plan with average lead time affect the operational horizon?



Typical planning situations	Consequences Tier-1 supplier	Consequences Tier-2 supplier
Wrong average lead times, tactically	Re-prioritization operationally with e.g. longer setup times than anticipated tactically. backlog risk	Re-prioritization to meet tier-1 demand signals with risk on late delivery (out of sync)
Increase of demand operationally & tactically	Re-prioritization operationally, with backlog risk and component shortages	Re-prioritization to meet tier-1 demand signal with risk on late delivery
Unplanned line stops	Increased queues in front of the line with risk of backlogs and re-prioritizations	Re-prioritization to meet tier-1 demand signals with backlog risk

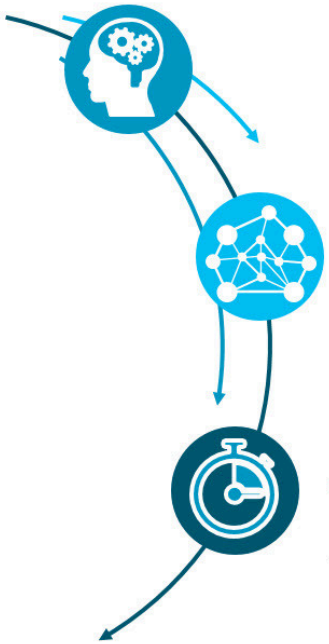
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Figure 3

Today's reality

Supply chain capabilities are not adequately reflected leading to supply variations and service level violations

Why is this happening along supply chain?



Limited Organizational Capabilities

not reflecting tactical manufacturing capabilities to sync supply plans centrally

Inadequate Tactical Plans

cannot be executed operationally and effect supply plans negatively

Hectic Operational Plans

lead to instability of manufacturing operations and a tactical re-planning and the beginning of short term protectionism and lead time inflation

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- Limited organizational planning capabilities without integrated local and global end-to-end accountabilities lead to **misalinged and infeasabile supply plans**
- Supply constraints (material and capacity) are not adequately considered, tactically **leading to over and understating of supply capabilities** and operational fire fighting
- Operational process instability **leads to constant repriotization** and thus to backlogs and material availability constraints effecting the tactical plan
- The end-to-end supply plan gets out of sync negatively affecting sales targets
- Operational protectionism of inadequate tactical plans **lead to higher inventories to protect service levels**

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