FORECAST LESS AND GET BETTER RESULTS

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LEAN FORECASTING

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STAY OUT OF THE SUICIDE QUADRANT

by

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EXECUTIVE OVERVIEW

This paper challenges conventional wisdom in the area of forecasting and planning: that companies need to project forecasts and plans far into the future at a detailed, highly granular level.

Our position is that, in most cases, this is not necessary. Rather, detailed forecasts and plans are normally needed only inside of what's called the Planning Time Fence. This is a point in the future: the cumulative lead time to acquire material and to build the product, plus a short time allowance for planning and order releasing. Inside of the Planning Time Fence, high granularity is needed. But, most often, not beyond it.

The paper presents four principles:

1. **Inside the Planning Time Fence, you must view things at the detailed, mix level.**

2. **Outside the Planning Time Fence, you should deal with aggregate volumes except in certain circumstances.**

3. **Beware of the technological imperative: just because you can do something doesn't mean you *should* do it.**

4. **Stay out of the Suicide Quadrant.**

The Suicide Quadrant refers to forecasting and planning at a *detailed* level over a *long* horizon. This approach results in poorer results and requires more work. In this era of Lean Manufacturing, it can be seen as non-value adding activity. And, in this era of Sales & Operations Planning, it's just not necessary to do it that way.

Last, the use of aggregate forecasts and plans facilitates the evaluation of risk among competing strategies.

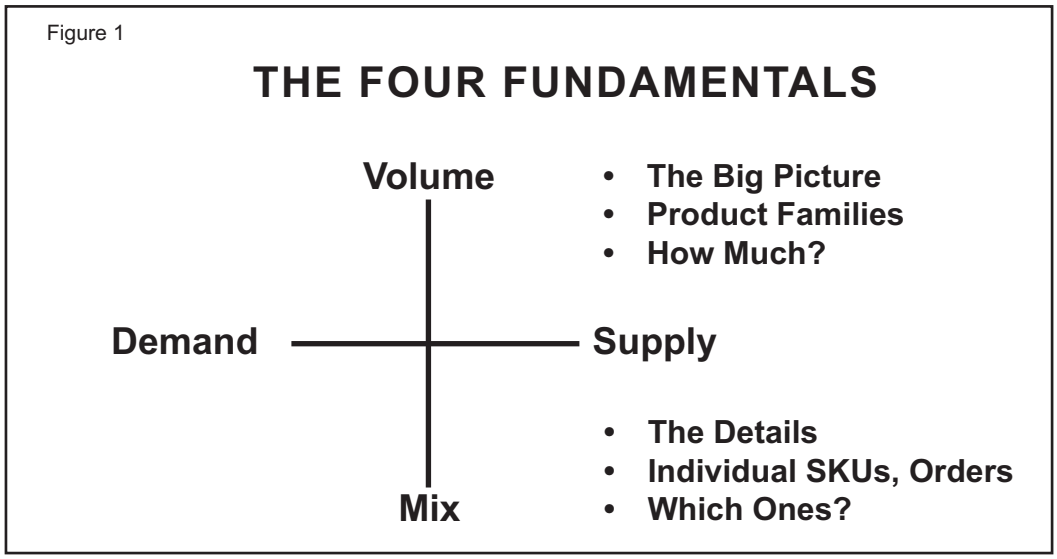
Volume and Mix Defined

The important task of getting products to customers centers around four fundamentals: demand and supply, volume and mix.

Economists speak of supply and demand, which we feel carries a mind set from the 1950's, the days following World War II when companies could sell whatever they made. Obviously, those days are long gone. Our world is demand driven, and thus we say "demand and supply." Demand is the driver. Demand is what the customers want, while supply refers to the resources we have available to meet that customer demand – both external and internal. Simple enough.

The distinction between volume and mix may not be so clear. Volume is the *big picture*, expressed in aggregate terms. It often deals with rates: rates of sales, of production, the aggregate finished goods inventory, the aggregate customer order backlog. The volume question is: *how much?* See Figure 1.

Figure 1



Mix, on the other hand, is the *details* – specific stockkeeping units (SKUs), customer orders, and so forth. Mix issues are typically ones of timing and sequence; the mix question is *which ones* to produce first, second, third.

Projecting Future Volumes – The Old Way

Back in olden times, around 40 years ago, the digital computer made its entry into many companies. It was exciting; people were able to do things that couldn't be done before. Of course, many of the things done on the computer in those early days didn't amount to much, and in some cases actually made things worse[1]. Here's one example.

In making longer range plans – necessary for the annual financial plan, among other things – the computer enabled people to project SKU forecasts out into the future for 12 or 15 or 18 months. Then they could have the computer roll up the individual forecasts (mix) into aggregate groupings such as families (volume). These projections could serve as the volume forecasts out through the end of the upcoming fiscal year.

1. Ollie Wight called this "the age of naive sophistication"

But that's not all. They could take those same detailed forecasts, input them into their master scheduling software, get individual line item master schedules for the next 12 or more months, and roll them up into aggregate production plans for the next fiscal year.

Pretty slick, eh? There was only one problem: the results weren't very good. The forecasts in particular seemed to be suspect, almost always at variance with the aggregate forecasts that the folks in Sales and Marketing were projecting. And further, the mix-based forecasts usually turned out to be less accurate.

But that didn't stop people from doing it. After all, this was the sophisticated approach; we were "harnessing the power of the computer." Over in Marketing, they were using mechanical calculators and manual spreadsheets. How could that possibly be as good?

Well, actually, it was better. The sales and marketing people were focused on *volume* numbers for past history and used those to project future forecasts . . . in aggregate. Then they modified those projections with adjustments for expected economic conditions and trends, anticipated market share changes, new product launches, the competitive climate, and so forth. They were looking at the *big picture*; others were mired in the *details*.

But many companies – often encouraged by Finance and Accounting folks and also those in Manufacturing – placed heavy reliance on the detailed, roll-up approach. Some still do. Why? Well, we suppose one reason is that it gives the illusion of accuracy because the process seems to be more precise. However, one of the things we were taught in Statistics 101 is not to mistake precision for validity. Precise numbers are not necessarily valid; they often give the illusion of validity but not the reality of it.

Projecting Future Volumes – The New Way

Today, with the emergence of Sales & Operations Planning as a primary management tool for balancing demand and supply, it's become more and more apparent that the detail/roll-up approach is not the way to go. Executive S&OP is all about volume. It's an aggregate planning tool and, as such, its presence is leading companies to make longer range forecasts *in aggregate.*

Further, companies can derive their medium to long term production plans directly from the aggregate forecasts. This is an integral part of the Executive S&OP process, where the production plan is set to balance future supply with future demand to meet targets for inventory and/or the size of the customer order backlog[2].

Why is this approach superior? There are three primary reasons:

- The results are more valid; the projections are better indicators of the future.
- It's easier to focus on big-picture issues such as economic indicators, competitors, market share changes, new product launches, end-of-life issues, and so forth – when one isn't lost in the details.
- It's substantially less work, a not insignificant factor for a process such as Executive S&OP that happens on a monthly basis.

[2] The backlog of customer orders refers to all unshipped orders in house, future as well as current and past due. The backlog is significant: the larger the backlog, the longer the lead time on the next order that arrives. Too short a backlog can cause difficulties in the plants. Manufacturing flexibility can enable the plants to function well with smaller backlogs and thus shorter lead times. This can enhance the company's competitive position.

A question arises: in the aggregate approach, how does one get an adequate view of the supply side? How does one know how much of a workload the new aggregate forecast is placing on production and supplier resources? Before we answer that, we need to get a key concept on the table.

The Planning Time Fence

The Planning Time Fence is that future point inside of which we need high granularity; we need to know the details. It represents the cumulative lead time to acquire material and to build the product, plus a short time allowance for planning and order releasing.

Some companies build products on a cycle, for example once per quarter. In these cases, the Planning Time Fence is set at the interval of that cycle time: 13 weeks in the once-per-quarter example.

For many companies, the Planning Time Fence (PTF) is four to eight weeks into the future. For companies doing a good job with Lean Manufacturing, the PTF can be a week or less – except for those obtaining many components from offshore. In those cases, the PTF could be at eight weeks or perhaps ten to twelve.

Given all of that, let's look at a fundamental principle:

Inside the Planning Time Fence, you must view things at the detailed, mix level.

You need a high degree of granularity inside the PTF because specific materials and components must be acquired and specific products must be built.

Here's another principle:

Outside the Planning Time Fence, you should deal with aggregate volumes, except in rare circumstances.

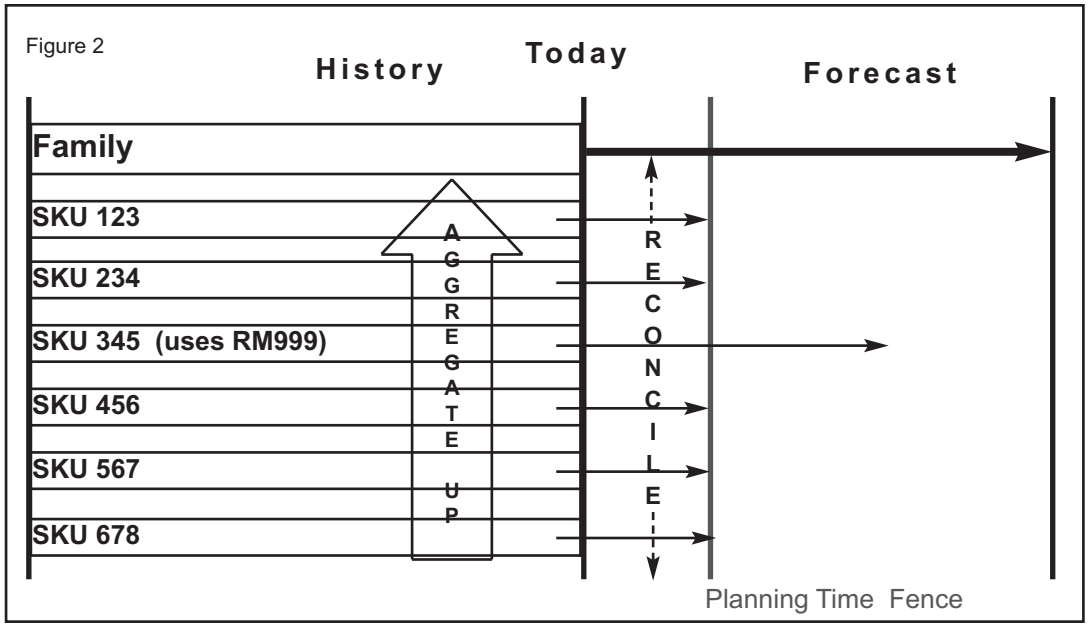
The information needed outside the PTF needs to be directional, and the volume view provides that. It's important to know what the overall volumes look like for the next six or twelve or eighteen months, or perhaps more, for a given resource (line, cell, work center, contract manufacturer, etc.).

What's not necessary is to see which specific SKUs will run on Line 11 forty weeks into the future. Even if you had that information, would it be of any value? Of course not – because it will change many times over the upcoming months as changes occur to forecasts, orders, inventory levels, and so forth. Today's "snapshot" will be obsolete tomorrow.

Now let's consider the disclaimer at the end of the second principle above: "except in rare circumstances." What's that all about?

Well, let's say we use a raw material that's grown only in a tropical rain forest in a remote corner of Borneo. Let's call it RM 999. The lead time for harvesting, transportation, initial processing, further transportation, final processing, and shipment of RM 999 to our plant is five months. But our Planning Time Fence is set at six weeks. What should we do?

It's simple: forecast and master schedule the individual product(s) using that raw material out for six or more months[3]. But . . . don't move the PTF for all products out to six months; do that for only the one(s) using this raw material. See Figure 2, and note that the product using RM 999 is projected beyond the Planning Time Fence.



Aligned Versus Non-Aligned Resources

Some companies have production resources that line up directly with their families[4] (which are typically market oriented groupings). In other words, all products within Family 1 are made in Resource A; all of Family 2 is made in Resource B, and so forth. The resources are said to be *aligned* with the families[5].

In these cases, the workload for the production resource can be seen right on the S&OP spreadsheet for the family. It's then a simple matter to compare that amount of work with the capacity for the resource. No problem.

On the other hand, many companies have resources that we call *non-aligned.* For example, some individual products within Family 5 are made in Resource A, others in Resource B, and still others in Resource C.

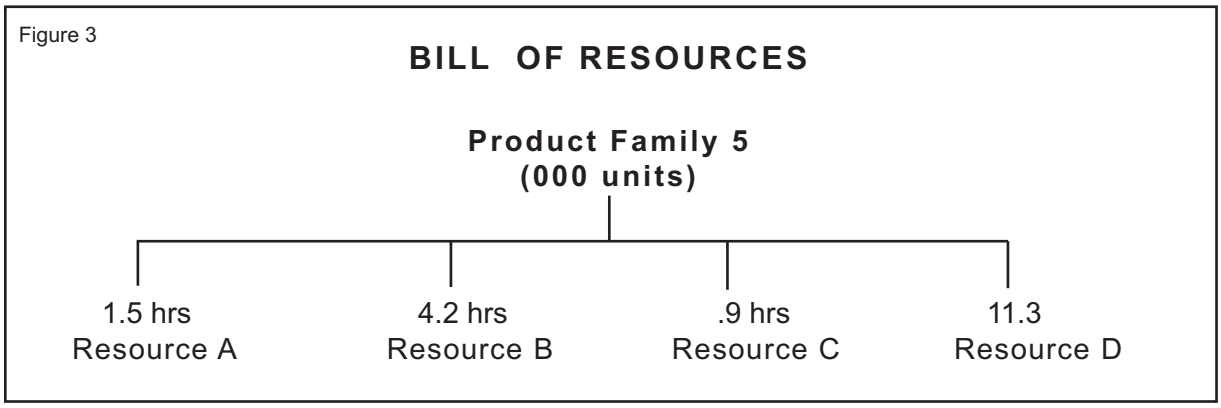
Thus it's impossible to look at an S&OP spreadsheet for a given family and derive the workload for a given resource. Complicating this is that fact that frequently the units of measure for the family (each, feet, liters, thousands, etc.) are different from those of the resources, which are most often expressed in hours.

[3] And use MRP to calculate the specific requirements for RM 999.
[4] Sometimes called "product families" or "market families." These are groupings that make sense to people in Sales and Marketing, and to the customers.
[5] One of the many contributions of Lean Manufacturing is that it leads companies to align resources. Substantial benefits can accrue.

Rough-Cut Capacity Planning

The solution here is to use an approach called Rough-Cut Capacity Planning.[6] This is a simple but effective approach that "translates" the production plans for each family into workload by resource. These key resources can be assembly lines, production cells, even individual work centers – in one's own plants or those of contract manufacturers. A key piece of data used in Rough-Cut Capacity Planning is the *bill of resources* (sometimes called *load profiles)*, shown in Figure 3.

Figure 3



Typically companies will perform this Rough-Cut Planning on high impact resources – the 20 percent of the resources that comprise 80 percent of the impact – and leave the detailed planning for the other resources to the tools and processes used for mix.

Figure 3 is telling us that it takes 1.5 hours of production time in Resource A to make 1,000 units of Family A, 4.2 hours in Resource B, and so on.

A similar technique, known as Rough-Cut Material Planning, translates family production plans into medium to long range requirements for key materials, to provide volume information to key suppliers. Note Resource D in the bill of resources: this may be a supplier, providing materials whose unit of measure is pounds.

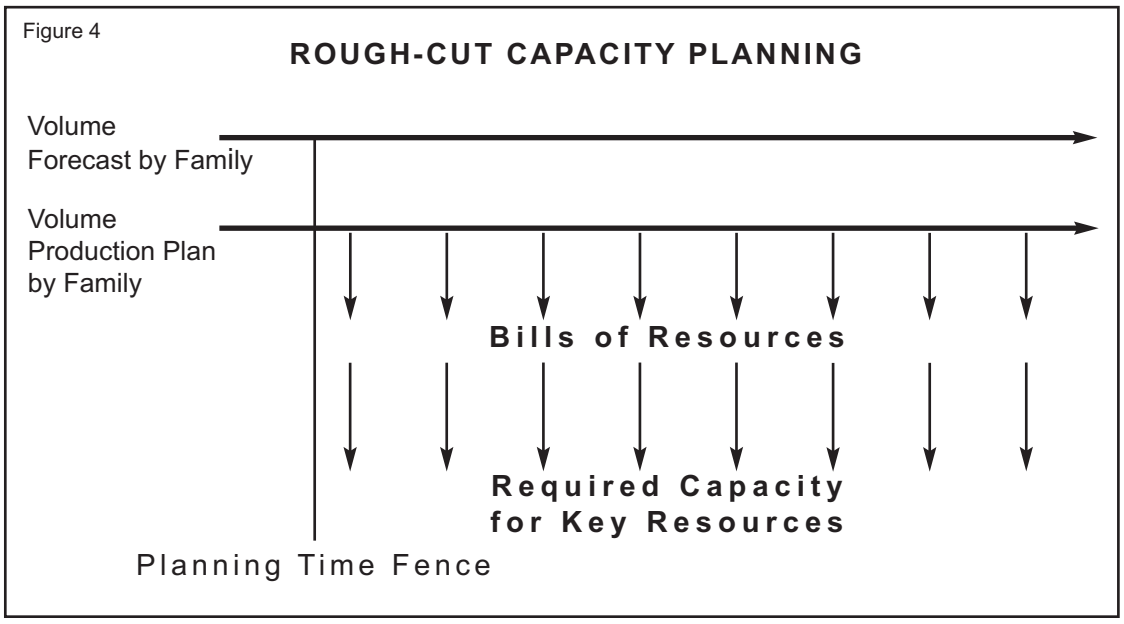
In the medium and long term, most suppliers are interested in the volume issue – how much? – and aren't normally concerned with mix – which ones: red, blue, or green? Close in, they care very much about the mix but not far out into the future.

Given today's expanded supply chains, companies today are including transportation and its required resources as part of the rough cut planning process. Requirements for rail cars, trucks, material handling stations, and the like can be estimated in a manner similar to production and supplier resources.

For a visual look at the Rough-Cut Planning approach, see Figure 4.

[6] Sometimes called Resource Requirements Planning

Figure 4



Simplifying Assumptions

There are two kinds of simplifying assumptions that we need to talk about here: one regarding sales mix and the other about resource consumption. Let's raise some questions, first about the sales mix:

- How many individual products make up Family 5 shown in Figure 3?

  Let's say 30.

- Do all 30 products place the same load on resources as shown here?

  Let's say they don't. For example, Product 5-1 may consume 1.2 hours of Resource A; Product 5-2 might take 3.0 hours; Product 5-3 may require .8 and so forth. The bill of resources is an average of all these.

- A simple average?

  No. It's a weighted average based on the percentage of each individual product's sales within the family. The *assumption* here is that the sales will follow a certain pattern.

- But what if they don't follow that pattern?

  They probably won't. And that's why these assumptions need to be reviewed and verified – or modified – frequently, so that shifts in the popularity of one product versus the others within that family can be identified and then reflected in the bills of resources.

The second set of simplifying assumptions deals with resource consumption. The bill of resources may be based, in part, on the fact that Product 5-2 uses 3.0 hours of Resource A. Might that change in the future? Certainly. Perhaps due to better methods in the plant, Product 5-2 may need only 1.1 hours in Resource A. Or perhaps Product 5-2 might be shifted to a new piece of equipment not in Resource A.

These kinds of changes call for corresponding changes in the bills of resources. This is a data maintenance job that must be done frequently. It need not, however, be onerous as software tools can be developed to:

- compare recent sales mix within families to that used in the bill of resources and point out the deltas to the people on the demand side of the business, and

- compare the bills of resources to the current routings and point out the deltas to people on the supply side of the business.

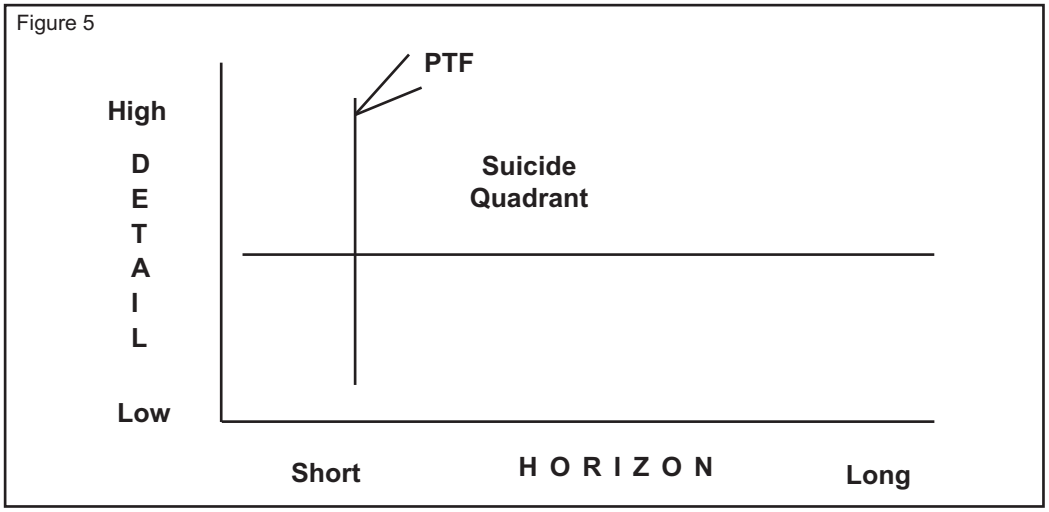
The example above represents a fairly simple situation. Some companies with more complexity will enhance this process, perhaps via the use of sub-families (broken out from their families along a resource orientation) or by adding another level into the bills of resources. This enables them to achieve the necessary level of focus while retaining the essential simplicity of the Rough-Cut process.

Doing this is far less work than forecasting and planning thousands of SKUs for many months into the future. And, what's even more important, it yields better results.

Beware of the Suicide Quadrant

The combination of detailed forecasts and plans – over a long horizon – is a losing proposition. In Figure 5, the area with high detail and long horizon is labeled "the Suicide Quadrant." We call it that because it yields poorer results, requires more work, and can drive you crazy. You might want to shoot yourself.

Figure 5



So our message is clear: avoid the Suicide Quadrant. If you're in it, get out. Executive S&OP can help here because, done properly, it will provide you with aggregate projections. These will be better than those rolled up using the detail. From these aggregate forecasts, you can derive operational plans – normally via the Rough-Cut technique discussed earlier – and future financial plans by dollarizing the aggregate plans.

But . . . implementing Executive S&OP can sometimes lead companies into a problem. Let's take the case of a company that decides to implement the process. They already have a statistical forecasting program that they used for projecting forecasts out over a six month horizon. When they learn that Executive S&OP

needs an approximately 18 month horizon, they simply flip a switch in the forecasting program and set the horizon at 18 months. Then they run those forecasts into their master scheduling program and project that out for 18 months, so they can determine resource requirements.

Well, it's easy to get the computer to do those things. The hard part is reconciling the sum of the detailed forecasts with an aggregate forecast made perhaps by someone in Marketing. These people, as we saw earlier, have information on economic conditions, market trends, competitive activity, and the like. If Marketing's aggregate forecast is accepted, then the difference has to be sent down into all the detail – to rerun the master schedule and recalculate the workloads.

That's a lot of work. And it adds little if any value. It complicates what is at heart a simple, straightforward process – Executive S&OP.

The principle that applies here: **Beware of the technological imperative: just because you can do something doesn't mean you *should* do it.**

And this leads us to our last principle: **Stay out of the Suicide Quadrant.** Keep it simple; work with the detail only where you need it. Use aggregate data where you can, and that's almost always that entire area beyond the Planning Time Fence.

Risk Assessment

Here's an example of how the Rough-Cut Capacity approach, coupled with Executive S&OP, can provide significant support for decision-making. Let's listen in on an Executive meeting at the Acme Widget Company.

Executive S&OP Process Owner: *Since we've introduced the new products into Family 5, sales are increasing a lot. Starting this summer, Marketing is forecasting 100,000 per month for that family.*

Based on that, we're going to need additional equipment in Resource A by November. The lead time to procure, install, and make the equipment operational is 6 months, which means that we'll need to place an order three months from now – in May.

President: *How solid are you Marketing folks with that forecast? What's the range?*

VP Marketing: *We're comfortable with it. The high side forecast is 120,000 and the low is 80,000.*

President: *Let's test those for the new equipment buy.*

Process Owner (keying in the low side forecast): *Okay, as you can see on the screen, at 80,000 we won't need the new equipment until February. And . . .* (more keying) *. . . here's the picture on 120,000. It says that we'll need the equipment on-line in August. That means we need to order now.*

VP Operations: *We're dealing with two different capacity strategies here: lead and lag. If we lead and buy now, we run the risk of having excess capacity for many months. If we lag and don't buy, but the high numbers materialize, we'll be incurring the costs of high overtime, expediting, poor customer service, and lost business.*

President: *Right now I'm leaning towards the high plan. I think it makes the most sense strategically but I'm concerned about the financial risk. Marty, could you have your folks dollarize these three plans against each of the three levels of sales? I'd like to reconvene tomorrow afternoon and put this to bed.*

CFO: *Sure, John, we'll be ready.*

Conclusion

Could the above scenario have happened – within a few minutes at an Executive meeting – if Acme Widget were working with full detail out across their entire planning horizon? It's very unlikely.

So here's a third benefit to using the aggregate approach in Executive S&OP. In addition to:

a) less work, and

b) better forecasts

it also enables a company to do *valid* simulations *quickly.* And more and more companies will begin to use this kind of simulation heavily, enabling them to get the full "bang for the buck" out of Executive S&OP and thereby make better decisions.

We need to add a word about software. Most successful users of Executive S&OP use Excel (or similar) for processing the information outside the Planning Time Fence, including the kinds of simulation discussed above. Recently, S&OP specific software has begun to emerge that can facilitate that and make it even more powerful.

This new approach to doing forward planning is not only better, but simpler. However, don't confuse simpler with easier to implement. For many companies, this new way is very different from how they've done it in the past, and thus can require major changes in organizational behavior.

But it's well worth it. Executive S&OP, operating on a volume level and built on valid assumptions, facilitates decision-making, enables simulation and risk assessment, and makes possible a more responsive, proactive way of doing business.

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