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How to Transform Your Capacity Planning Process

A Step-by-Step Guide

Overview

This slide share outlines the following

1. What is capacity planning?
2. How do you achieve an optimal, feasible plan
3. How do you optimally balancing supply and demand for profit?
4. What are best practices for embedding capacity planning into a broader planning process?
5. Driving true business impact
6. Closing remarks

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What is Capacity Planning?

- Capacity planning involves making medium to long-term decisions that establish a firm's overall level of resources.

  - Primarily includes production and labor but ideally should also include inventory and storage

- Capacity decisions affect a company's ability to compete via:

  - Product availability/customer service levels

  - Production lead times

  - Customer responsiveness

  - Operating costs

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What Are the Minimum Objectives of Capacity Planning?

The minimum objectives of any capacity plan should include:

- Maximize a company's ability to meet demand
- Minimize cost
- Manage risks
- Efficiently allocate investments

Most capacity plans don't align with strategic objectives, and the ability to measure how well a plan drives outcomes is near impossible.

This is the problem we address in three parts.

Getting to a Feasible and Optimal Plan

Part One

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The Importance of an Optimal, Feasible Plan

1	**Boosts Confidence in Your Team** A manager that produces a plan with high confidence gains respect and the ability to effect further change in the business.
2	**Drives Performance** Reduces cost and improves the ability to meet service level and inventory objectives; can achieve dramatic reductions in production hours– most of them overtime – while increasing service levels almost to 100%. Ultimately generates agility so the business can more easily adapt to changes.
3	**Helps Avoid Costly Mistakes**

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Capacity Planning: The Feasible Plan

- A feasible plan will behave in such a way that it represents reality with a high degree of fidelity.
- A feasible plan will respect all of the physical and labor constraints + inventory and service level policies and targets.
- A feasible plan will also produce a financial forecast (revenue, COGS, gross profit) that is achievable.
- A feasible plan helps you avoid surprises that leave you using overtime while running some lines under 50% utilization

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Key Decisions of Capacity Planning

These key decisions must be included to achieve a feasible plan:

1	**Shifts**. How many shifts should we run during the week? On Saturdays and Sundays?
2	**Sourcing.** Where/when should we manufacture certain products?
3	**Inventory Planning.** How much inventory should we build for which products? In what time frame?
4	**Investments.** What investments can increase the effective utilization of capacity, e.g., uptime, throughput, investments to reduce cost, greenfield, etc.?

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Considering Trade-offs and Constraints for a Feasible Plan

Key decisions must consider multiple trade-offs and constraints that represent business realties.

Five trade-offs and constraints that play a part in minimal level capacity planning are:

1. Capacity of assets
2. Throughput
3. Investments
4. Finished or near-finished inventory
5. Third parties

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Trade-offs and Constraints

1. Capacity of assets:

   - Primarily, manufacturing but also packaging lines
   - Uptime capacity
   - Production lines labor — allocated to production lines with some lines requiring more or less of different skill sets
   - Labor management at the shift level
     - Most plants run 2 shifts, 5 days a week, others run 4 shifts, including on Saturdays and sometimes on Sundays.
     - Labor costs more for overtime and typically on Saturdays and Sundays.

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Trade-offs and Constraints

2. **Throughput** affects the effective capacity and changes the equation from strictly hours available to units per hour available. Therefore, production sourcing is an integral part of capacity planning.

3. **Investments** represent further trade-offs

   - Help increase throughput, lower cost per unit
   - Increase overall equipment effectiveness (OEE) — often at a cost

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Trade-offs and Constraints

4. Finished or near-finished goods inventory:
   - Meet seasonal or unpredictable demand
   - Balance expensive weekend/overtime production versus meeting demand
   - Consider the cost of holding inventory, product perishability, etc.
   - Manage risk, especially if risking inventory that may become obsolete
5. **Third parties.** Alleviates capacity constraints for flex capacity

The "Outdated" Way of Capacity Planning
This often leads to infeasible plans and loads of wasted effort

1	Begin with demand by time period and region/location
2	Work backwards to define the inventory needed at the DC, taking into account existing inventory
3	Adjust inventory requirements for lead time
4	Use inventory requirements to define manufacturing production requirements
5	Assign production requirement into production lines, typically using some convoluted ruleset
6	Assign production of product 1 first to line A, then if it overflows, go to line B, then C, etc.
7	Assign production of product 2 first to line C, then if it overflows, go to line B, then D, etc.
8	Aggregate production requirements into overall hours required to meet the plan
9	Manually sift through the plan to identify weeks when capacity required exceeds 100% of capacity available
10	Make manual adjustments to the existing capacity plan
11	Work backwards to determine how many shifts are needed

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Achieving an Optimal Plan

An optimal plan is not only feasible; it's the plan that allows the business to maximize or minimize the objectives it's trying to meet. Determining whether your plan is optimal is actually easier than you may think, **just ask your team the following questions:**

1	Are we using linear programming (LP) to define the plan or simply rules?
2	If we are using an LP, what is the objective function?
3	What decisions is the LP helping us make? These can include sourcing, optimizing shift configuration, forecasting inventory build ahead and even allocating capital investments (ideally, it includes all of them).

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Optimally Balance Supply and Demand for Profit

Part Two

Planning for Profit

Planning for profit means changing the objective of capacity planning from minimizing production or cost of goods sold to maximizing gross profit. With two simple changes, the impact can be significantly improved:

1. Focus on maximum profit instead of minimum cost.
2. Extend the plan from trying to meet demand to balancing supply and demand.

Change How Costs are Measured

Most capacity plans measure cost in a way that is not truly reflective of how the business incurs cost. Costs should be treated at the same level of detail as the business works.

✓Cost of labor should be allocated to lines based on number, skill and cost of personnel required for each line.

✓Labor should be modeled in shifts, differentiating overtime and weekend work that is typically more expensive.

✓Costs of having a line active should be associated with that line.

✓Cost of production processes should include the input cost as well as variable cost per unit.

✓Inventory costs should include storage, degradation and cost of capital.

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Proactively Balance Supply and Demand

- Layering on profit requires understanding the revenue associated with demand — at a minimum, collecting information on net prices by product or SKU, location, and time period.

- Most capacity planning treats demand as fixed instead of focusing on delivering the highest possible service level.

- Understanding demand should extend beyond simple average price per product.

Understanding the Financial and Profit Impact of Your Demand

- ## Managing Service Level Shortages
  - Understand which demand to short from a profit-contribution perspective.
- ## Understanding Product Profitability
  - Trade-offs made from financial perspective.
- ## Demand Generation and Revenue Management
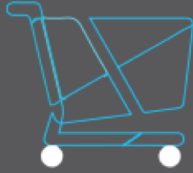 - Simultaneously align demand generation initiatives with the allocation of capacity.

Figure 1 Analysis of marginal revenue, cost and profitability

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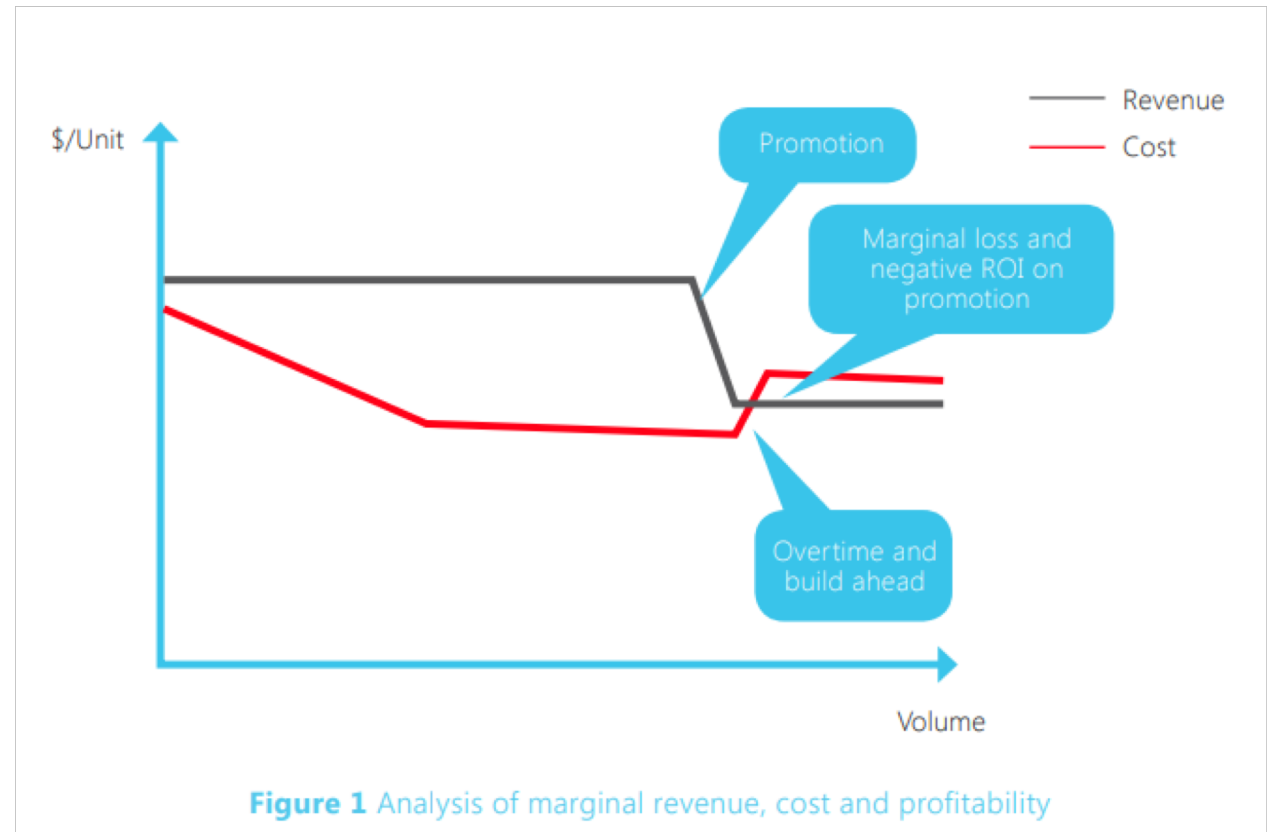
Improving Capacity Planning Analyses

Plans more closely tied to profits drive true impact like:

- ✓ Improved Baseline Capacity Plans
  - Shifts, Saturday/Sunday/overtime and sourcing would all be tied to profit and to the marginal demand generation activities.
- ✓ Improved Inventory Management
  - Answers questions like "What is the real trade-off between lead time/customer penalties, likelihood of obsolescence, costs and profits?"
- ✓ Investment Analysis
  - Instead of evaluating investments against throughput or unit cost, know marginal impact on profit.

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Industry Examples: Improving Capacity Planning

CPG/FMCG	Building Products	Mining and Metals
In CPG/FMCG, where demand is driven by promotions, the company would be able to see the true impact of their promotion dollar allocations on the margin. In those weeks where they may be running a BOGO (buy one, get one free), demand would be very high but the marginal price would be half. What if they also had to work overtime and on Sundays to meet this demand?	In building products, demand is more driven by bids and contracts with wholesalers/large retailers like Home Depot. Instead of a BOGO, here we would analyze different bids and whether there are different options for making them more profitable.	We can even extend the example into mining. What if the price curve for different grades of product becomes flatter or steeper? Would that mean you want to run certain mines harder, prioritize certain grades or blend different products at the mine or port?

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Embed Your Plan into a Broader Planning Process

Part Three

Embed Plans into a Broader Planning Process

- Properly done, capacity planning impacts gross profit and provides a unique perspective on contribution margin.
- Capacity planning has a direct effect on a company's ability to meet corporate and business unit objectives
- Capacity planning is a multi-user, collaborative monthly process that ties into S&OP.
  - The planning horizon is typically 24-60 months, and depending on the industry's granularity, it is either weekly or monthly
  - Ideally guides strategy planning and execution
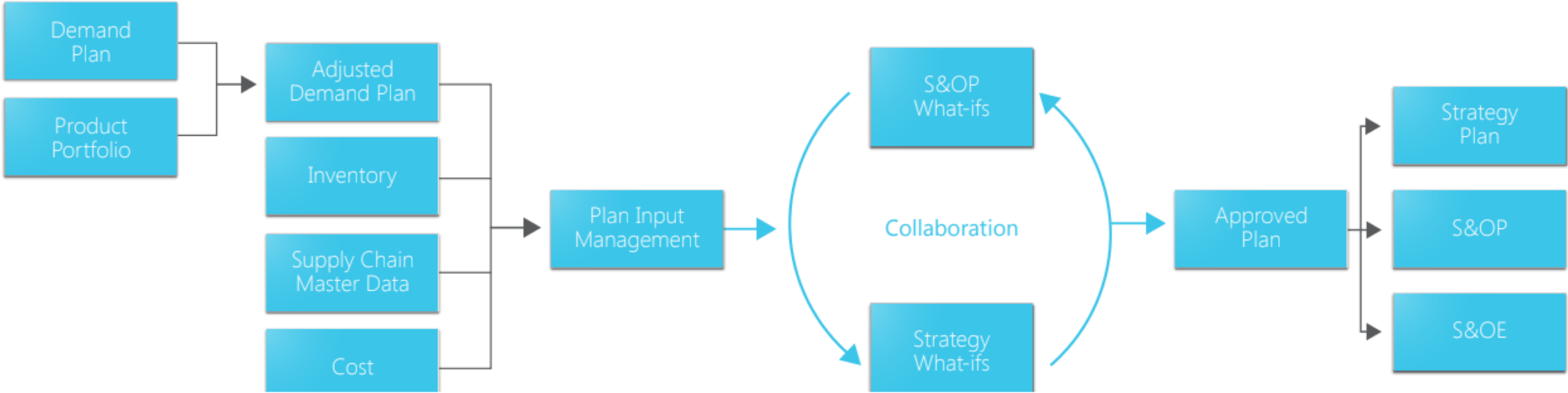
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Best Practice Capacity Planning Process

Figure 2 The best practice capacity planning process

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Gather the Appropriate Variables

1. Demand Information
   - The demand plan needs to be adjusted to a longer time horizon with a similar level of granularity throughout.
   - Be able to adjust the plan to reflect new product introductions, product sun-sets, etc.
   - Include baseline versus lift or upside demand that is associated with additional spend, discounts or other activities that drive demand.
2. Inventories
   - Must include finished good inventories at the DCs and manufacturing plants.

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Gather the Appropriate Variables (Cont.)

3.   **The Supply Chain Network.** This includes all the information related to the supply chain network. At a minimum, these include:

- Product master and hierarchies
- BOMS
- Routings
- Manufacturing assets
- Production information
- Labor
- Supply Chain information like lead times, supplier info, etc.

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Gather the Appropriate Variables (Cont.)

4. Costs

- Input costs. Cost per unit or cost per ton for key raw materials; supplier discounts.
- Labor costs. Cost to run the assets and is driven by capacity requirements.
- Conversion costs. Costs to run the assets, such as energy and maintenance as well as yield losses, etc.
- Inventory costs—storage, degradation, cost of capital, etc.
- Transportation. Includes data per truck, per ship, per aircraft, per shipment, etc.

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Executing the Process: Best-Practice Capacity Planning

Once all the input has been submitted, the capacity planning teams can begin processing the information according to the steps laid out in Figure 1. Next 3 steps outlined: data management, scenario analysis and publication.

Figure 3 Executing the Capacity Planning Process

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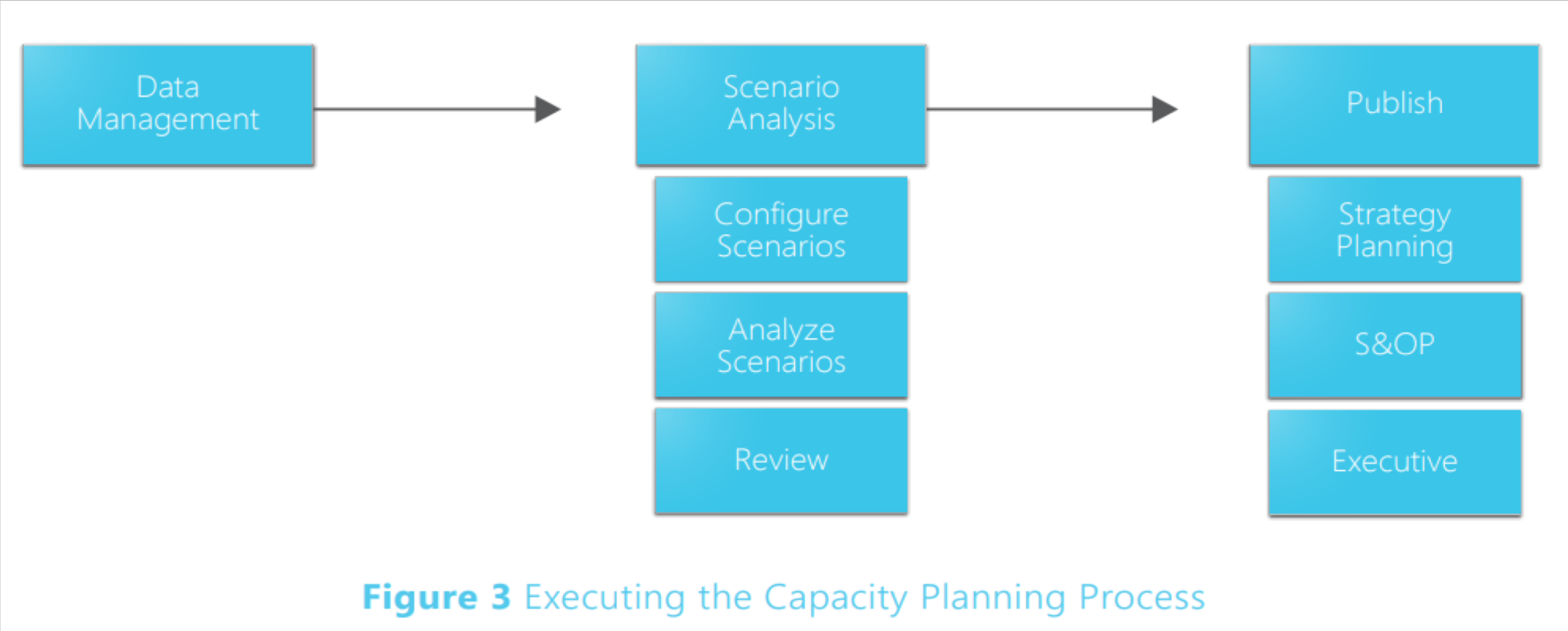
Executing the Process: Best-Practice Capacity Planning

Step 1: Data Management. Performed by different planners, associated with different functions; this step's objective is to ensure the data is ready for the planning process.

Step 2: Scenario Analysis. Data is first processed to support analysis of different scenarios, enabling user collaboration around a recommended path.

- Configuring the scenarios, analyzing scenarios, and reviewing

Step 3: Publish. Capacity planning should inform different processes within a company such as:

- Strategy planning, S&OP, and Executing

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Driving True Business Impact

Closing section

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Best-Practice Drives True Business Impact

✓ Shared Knowledge of Organization Rises

  ✓ People across functions begin to understand the impact they can have on other functions, translating into incredible gains in business agility and stronger team performance.

✓ Trust in Plans Rises Significantly

  ✓ People are trusted to "meet their numbers" and can have more impact as they demonstrate they know how to best use company resources.

✓ Gross Profit Increases

  ✓ Companies that have deployed capacity planning as an ongoing, collaborative process have seen significant improvements in gross profit, with as much as 2-5% of revenue translated to additional profit.

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Closing Remarks

- Change is always hard, but there are ways to get started that generate quick wins and help managers lead the way.
- The scope is manageable. It is possible to set up a targeted deployment in a matter of 6-8 weeks.
- The targeted implementation should yield results immediately.
- At this point, the ROI will be well documented, as will the process of managing the data and adapting the process to support the broader organizational need.

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Where to Go Next?

- A Step-by-Step Guide to Driving Business Impact with Capacity Planning
  - [Download white paper](#)

- Capacity Planning
  - [Download infographic](#)

- Contact the experts
  - [River Logic](#)