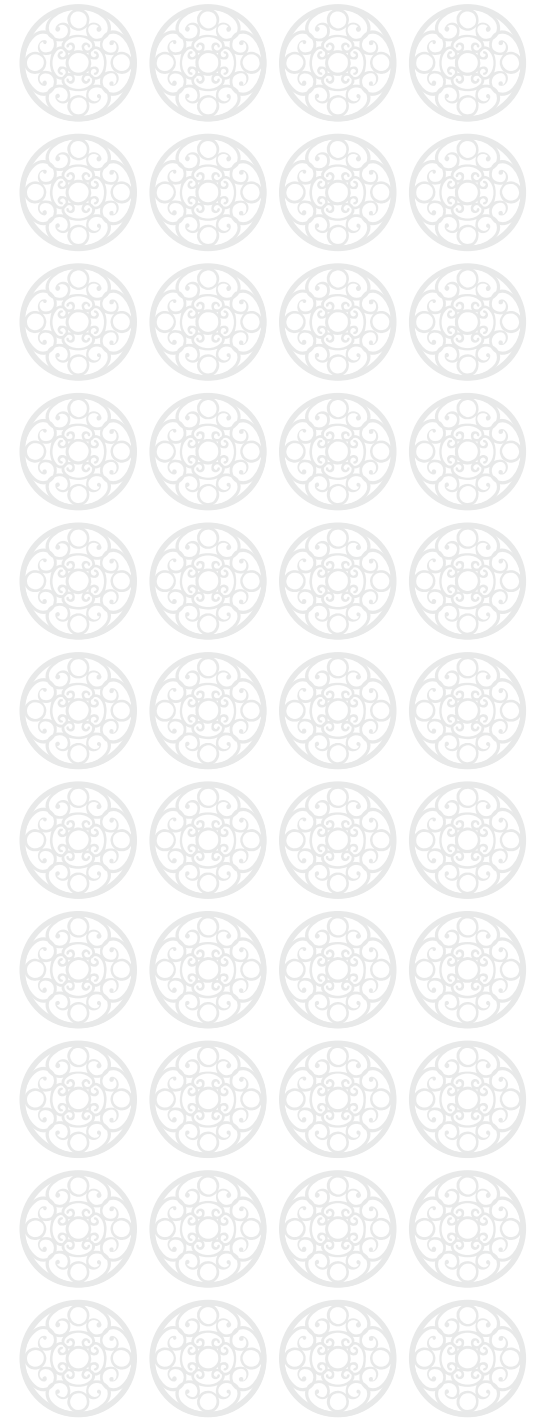


APICS2014

The Impact of Complexity Costs on Operations Planning

Chris Seifert & Scott Stallbaum
Wilson Perumal & Company

#APICS2014





Chris Seifert, Manager Wilson Perumal & Company

- Expertise in manufacturing, operational excellence, and management system design and implementation
- Former Operations Leader, Owens Corning (increased plant productivity by 25% in just 9 months)
- Former Plant Manager and Manager of Business Strategy & Analysis, Georgia Pacific (Koch Industries)
- Top-ranked submarine officer, US Navy (ranked #1 of 9 submarine junior officers)
- MBA, Summa Cum Laude, University of Georgia; BS Business Administration, St. Louis University



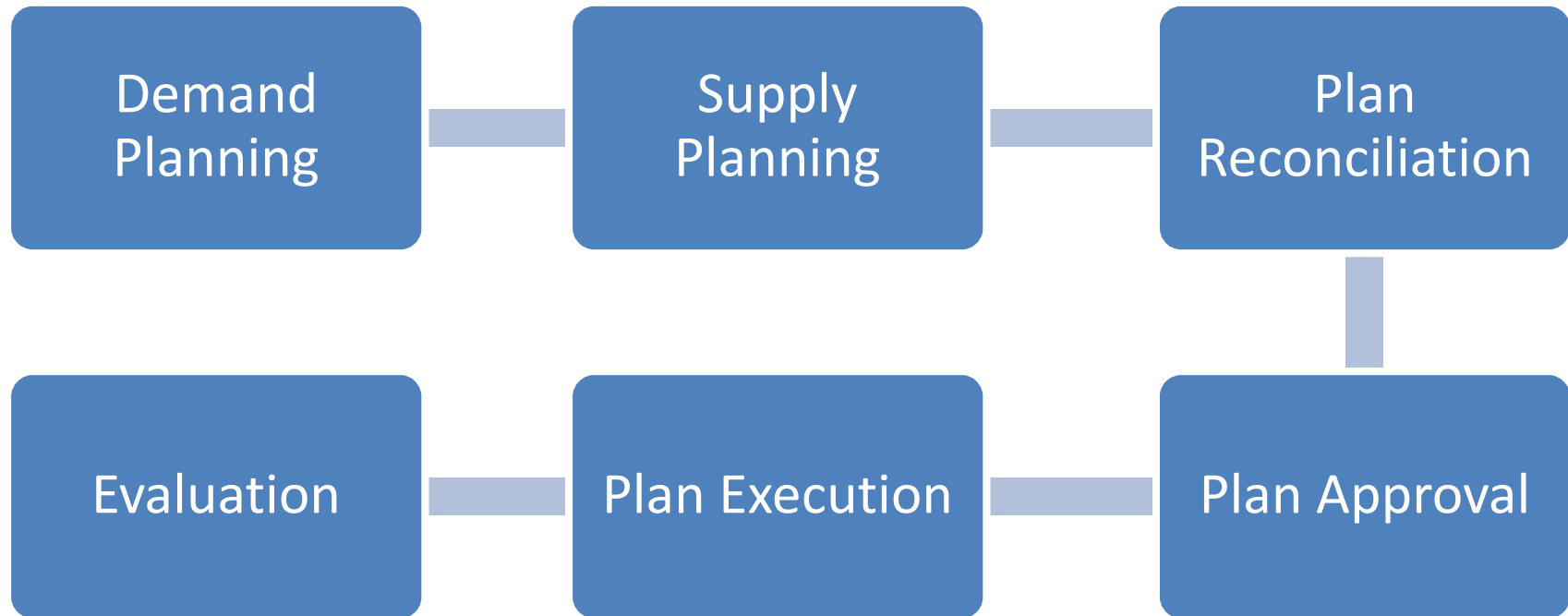
Scott Stallbaum, Case Team Leader Wilson Perumal & Company

- Expertise in manufacturing, operational excellence, and management system design and implementation
- Former manufacturing & budgeting/planning leader and in the medical device industry
- Former new model launch program manager, manufacturing engineer and front line supervisor in the automotive industry
- MBA, Harvard Business School; BS Mechanical Engineering, Bucknell University

Agenda

- Why traditional S&OP approaches are failing
- 3 steps to make S&OP more effective
- Gaining a better understanding of costs
- Case study

When the S&OP Process fails, we often blame a lack of collaboration...



...but is that really the reason, or is there something more sinister at work.

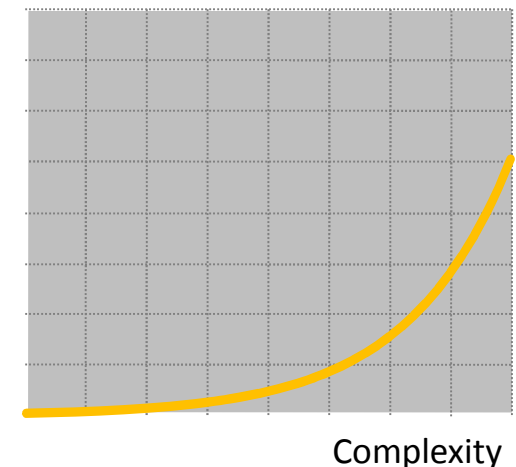
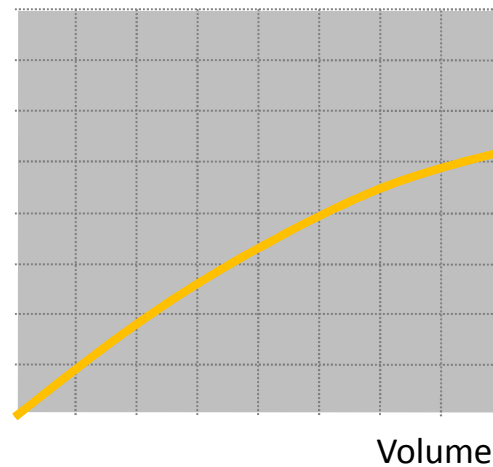
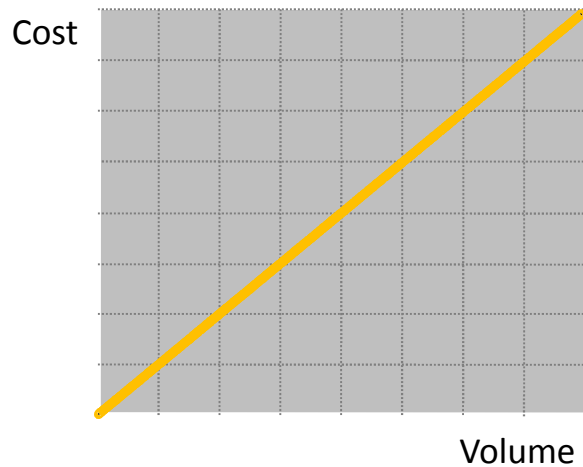
The world has changed!



“Individual productivity”

“Economies of Scale”

“Complexity”



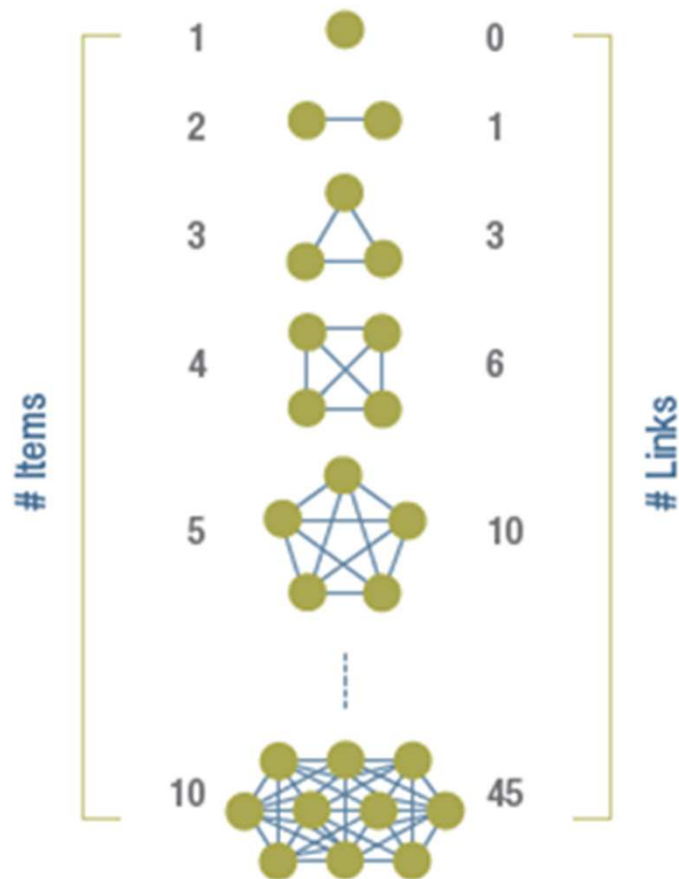
Dominated by
variable costs

Dominated by
fixed costs

Dominated by
complexity costs

Complexity grows exponentially

The Number of Links Increases
Geometrically with the Number of Items



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Characteristics of Complex Systems

1. Non-linear reactions
2. Emerging properties
3. Feedback loops
4. Unknown interactions

These characteristics make Complex Systems almost impossible to predict and control

Complexity is stretching the capabilities of most companies

TECHNOLOGY IS MORE COMPLEX

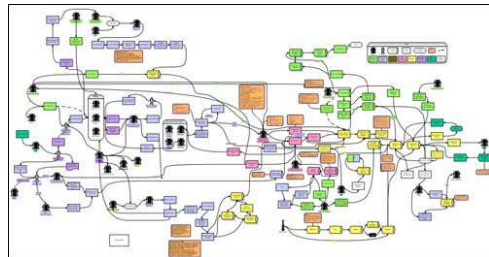


PRODUCTS AND SERVICES MORE COMPLEX

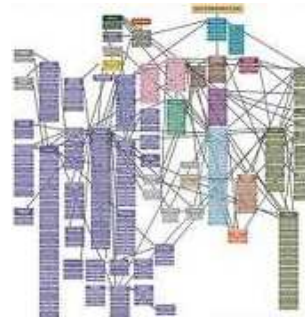


X

PROCESSES MORE COMPLEX



ORGANIZATIONS MORE COMPLEX



X

MARKETS MORE COMPLEX



X

X

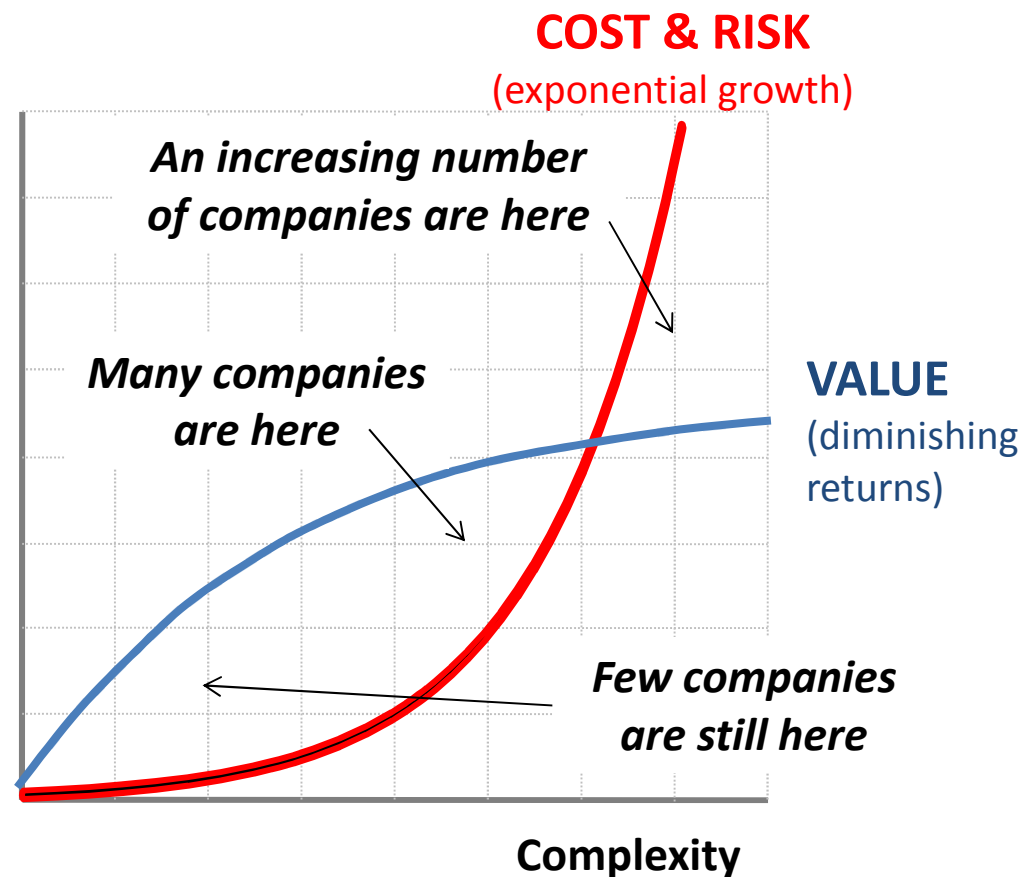


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REGULATIONS MORE COMPLEX

Many companies are passing a complexity threshold

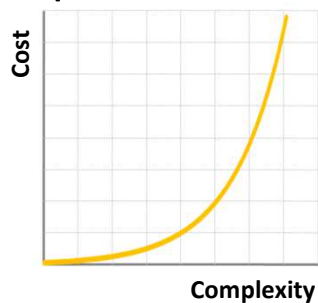
Costs and operational risk grow exponentially with complexity



Complexity has impacts across your business

Cost & Operations

- Hidden costs
- Exponential growth
- Cross subsidization
- Most products are unprofitable



Business & Operational Risk

- Grows exponentially with complexity
- Cannot anticipate all points of failure

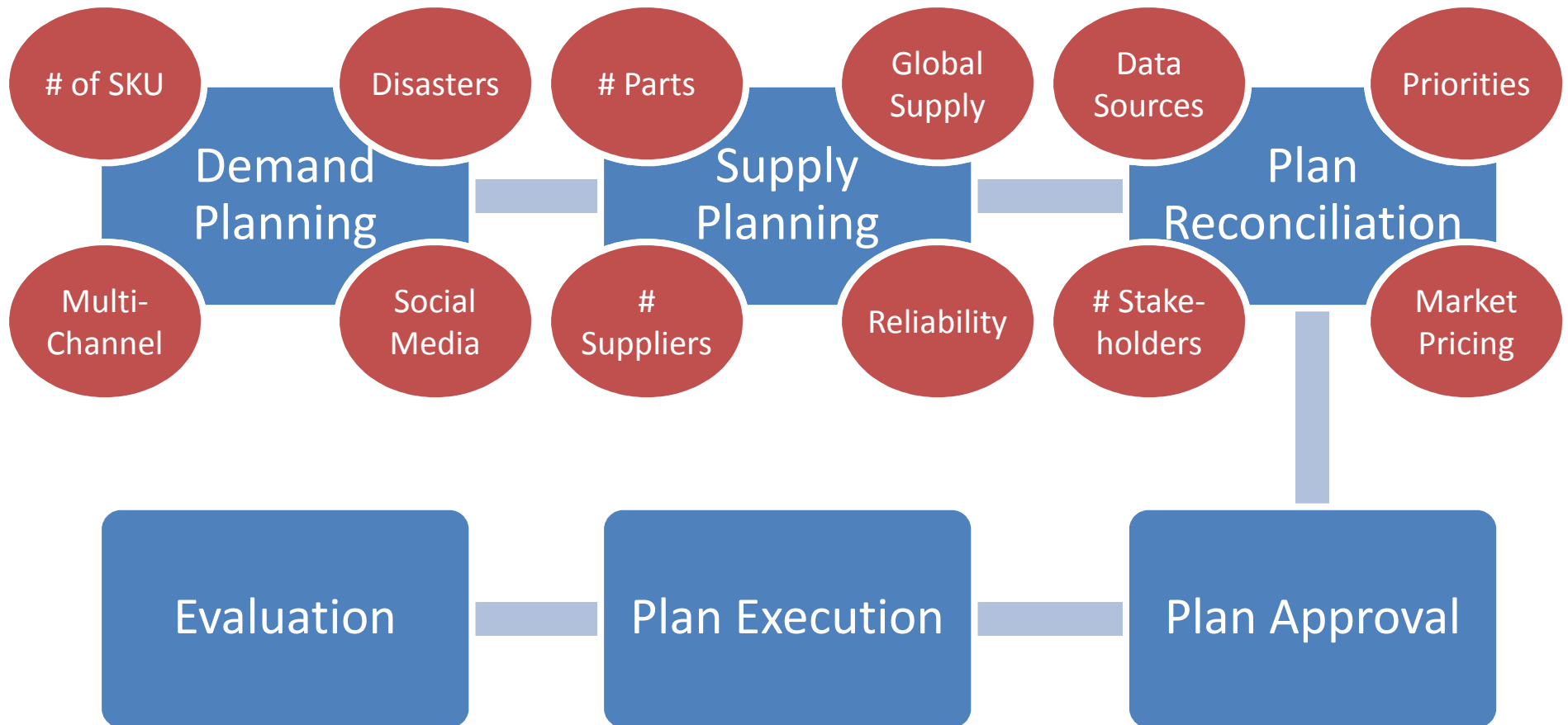


Growth & Innovation

- Slows new product development
- Overwhelms customers
- Distracts sales force



It also impacts your S&OP Process

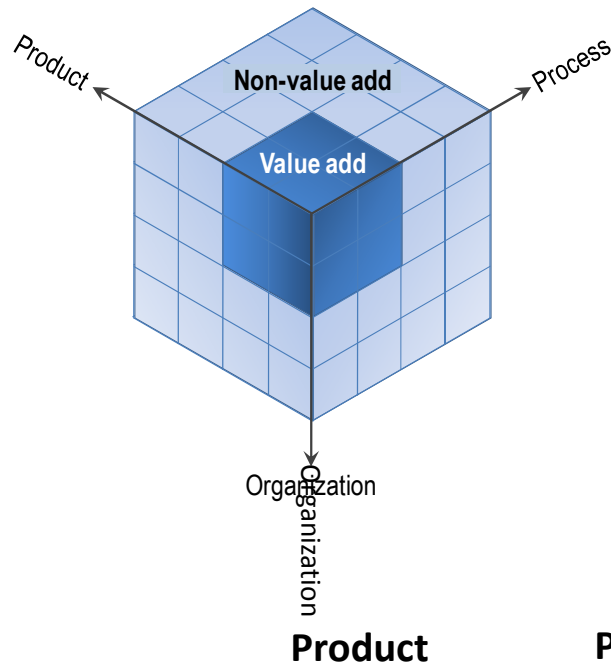


Understanding the true *Cost of Complexity* allows you to.....

1. Remove non-value added complexity from your business
2. Focus on optimizing total delivered cost
3. Create dynamic optimization models

Costs arise from the interactions between the 3 types of complexity

The Complexity Cube:



- **Complexity** exists along the dimensions of the cube
 - Can be good or bad
 - Too much is bad
 - Companies almost always have too much
- **Complexity costs** exists on the faces of and within the cube
 - Results from interactions between the dimensions of complexity
 - Grows geometrically with complexity (largest driver of cost competitiveness)

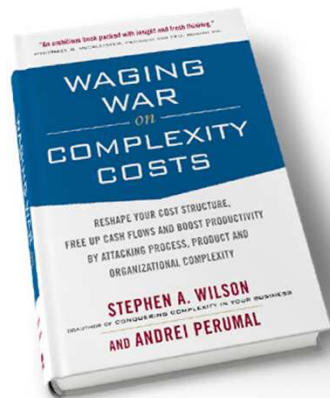
Complexity results from a large # of interconnected "items":

#Items		#links
1	●	0
2	●—●	1
3	● ●—●	3
4	●—● ●—●	6
5	●—● ●—● ●—●	10
	⋮	
10	●—● ●—● ●—● ●—● ●—●	45

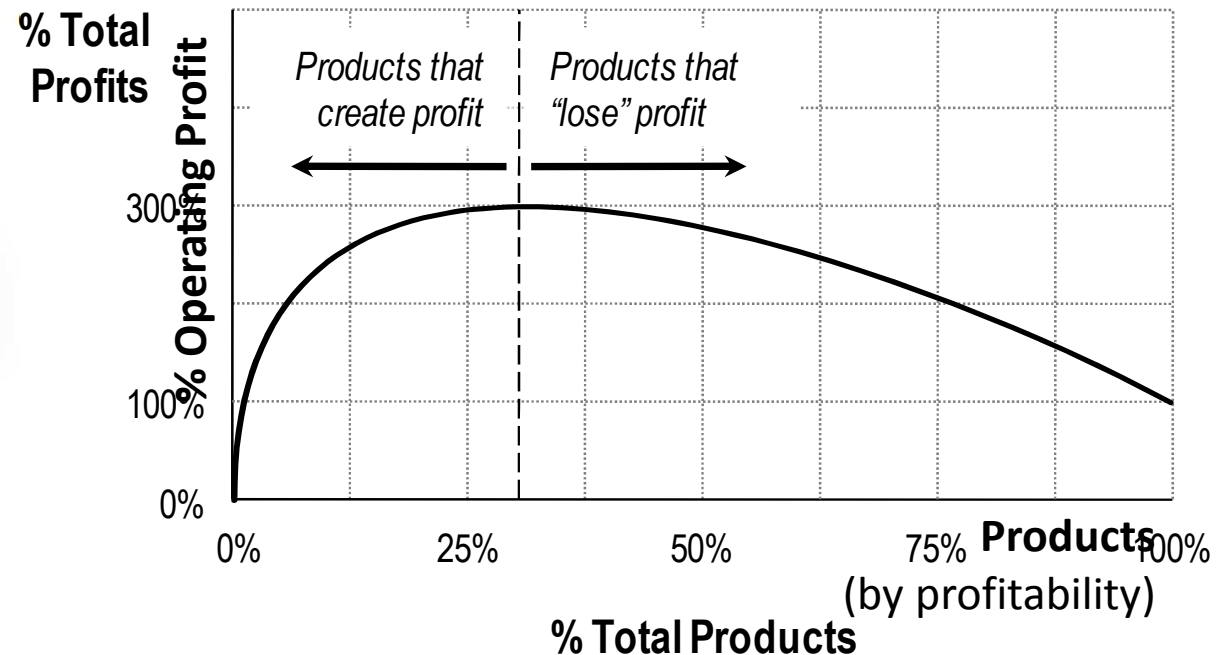
Complexity is the number of things:

Product	Process	Organization
Number of products and services you offer	Number of processes, steps, handoffs, etc.	Number of assets, facilities, entities, partners, etc.

The magnitude of the complexity issue for many companies



Typical “Whale Curve”



- Often the most profitable 20% to 30% of products generate more than 300% of the profits in a company, meaning...
- ...the remaining 70% to 80% lose 200% of the profits.

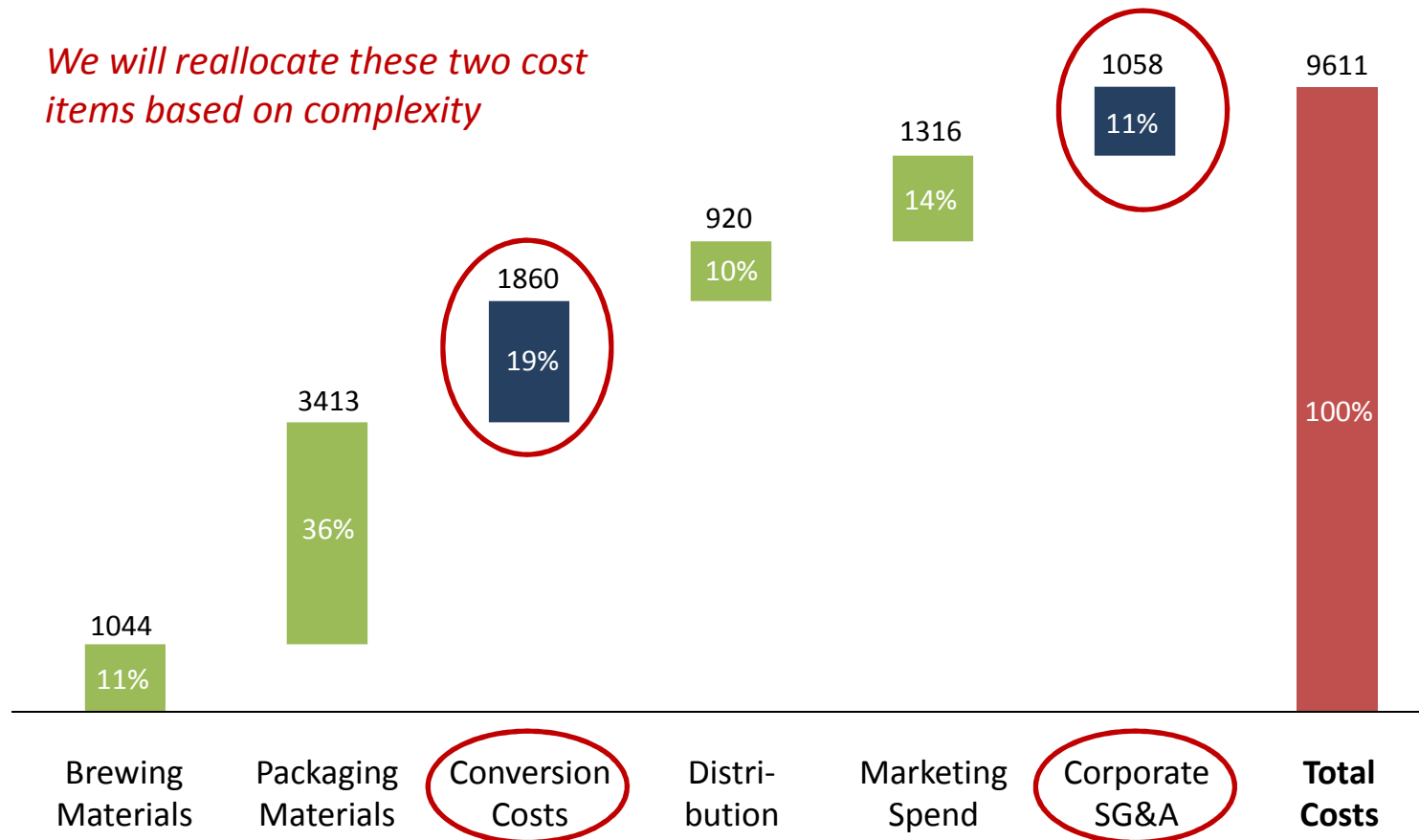
Case Study: Central Brewing Co.

- Central Brew Co. (CBC) one of the Big 3 (40% market share)
- Market shifts led to changes in CBC strategy: Craft Brands
- Frank (CEO) hearing dispute between 2 key executives
 - *“Our margins on Craft brands are high”* (Victor, CMO)
 - *“We can’t handle the complexity; our costing is wrong”* (Roberto, COO)
- Strategic questions: Is the new focus on Craft working?
- **Analytical question: What is the real cost of the complexity and is it fully represented in product profitability?**

Reallocating costs

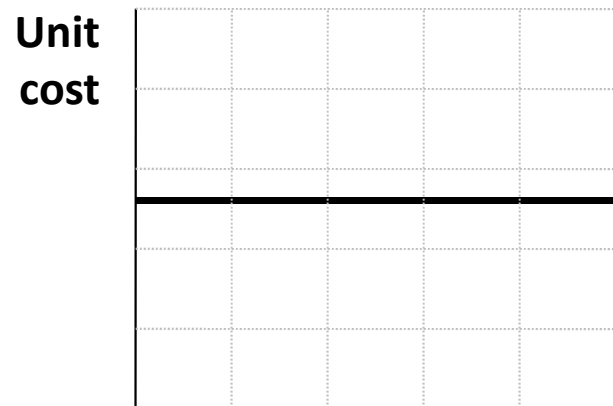
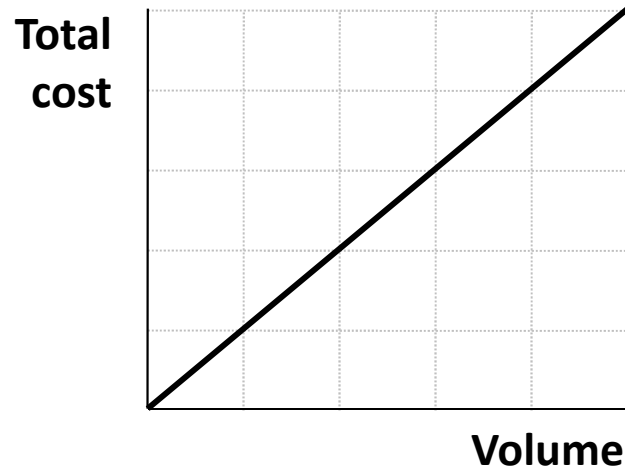
Annual Costs (\$M)

We will reallocate these two cost items based on complexity

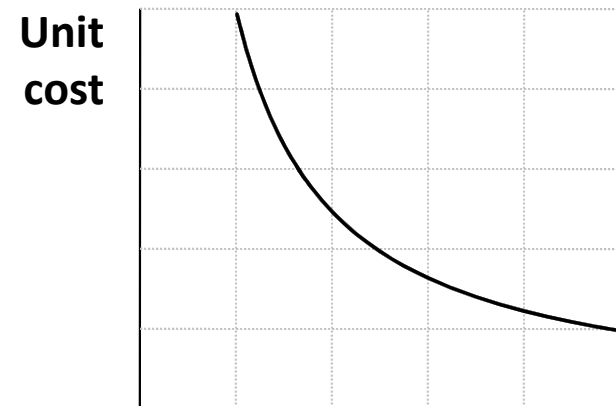
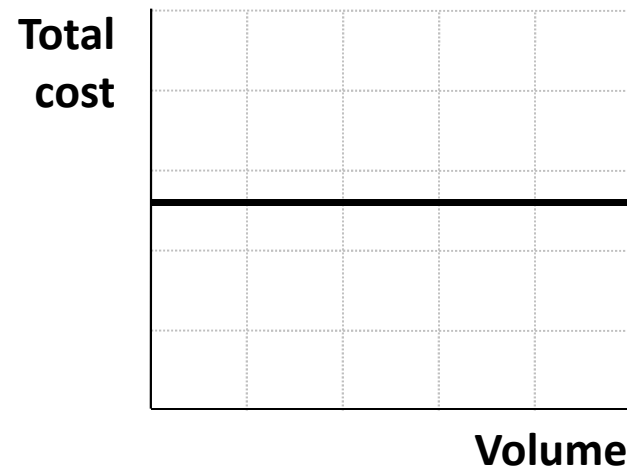


Which allocation to use?

By "Volume"



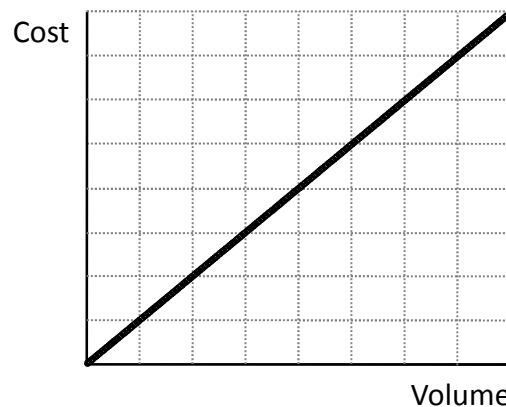
By "Item"



Traditional fixed/variable cost paradigm is no longer sufficient

Pre-Industrial Age

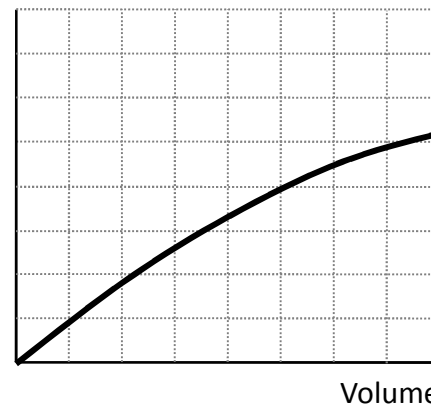
“Individual productivity”



- Energy limited by muscle power (man or beast)
- Little scale efficiencies
- **Efficiency driven by strength and/or speed of individual working unit (narrow range)**

Industrial Age

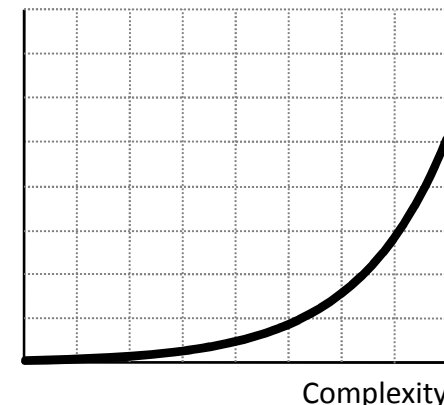
“Economies of Scale”



- Revolution in energy and machinery (steam, electricity, oil) create significant scale economy
- **Efficiency driven by volume—“larger is better” (nearly unlimited range)**

Post-Industrial Age

“Complexity Costs”



- Significant growth in variety drives geometric growth in “complexity costs”
- **Efficiency and affordability driven by balance between volume and complexity (complexity is the opposite of scale)**

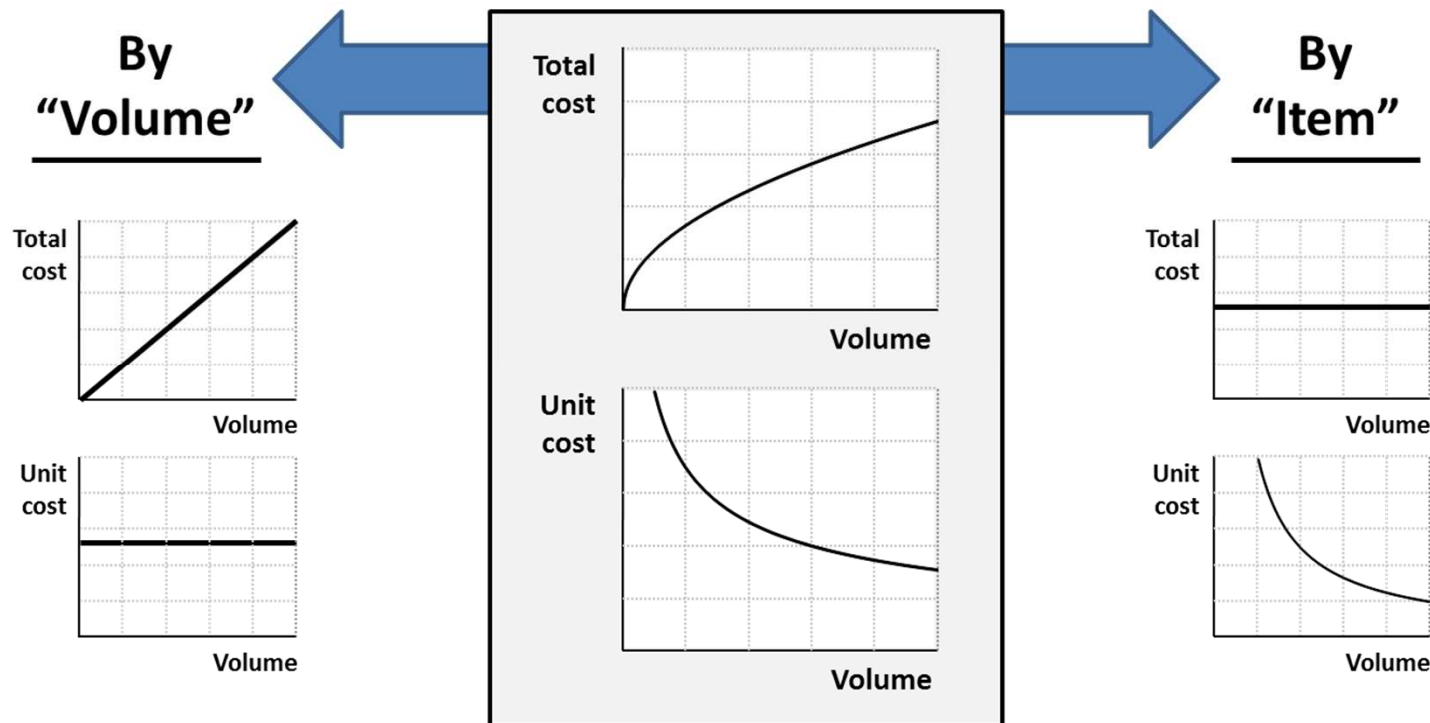
- **Complexity is the opposite of scale**
- **Complexity costs are now the largest driver of a company’s cost competitiveness**

Most complexity costs follow the Square-root of Volume relationship

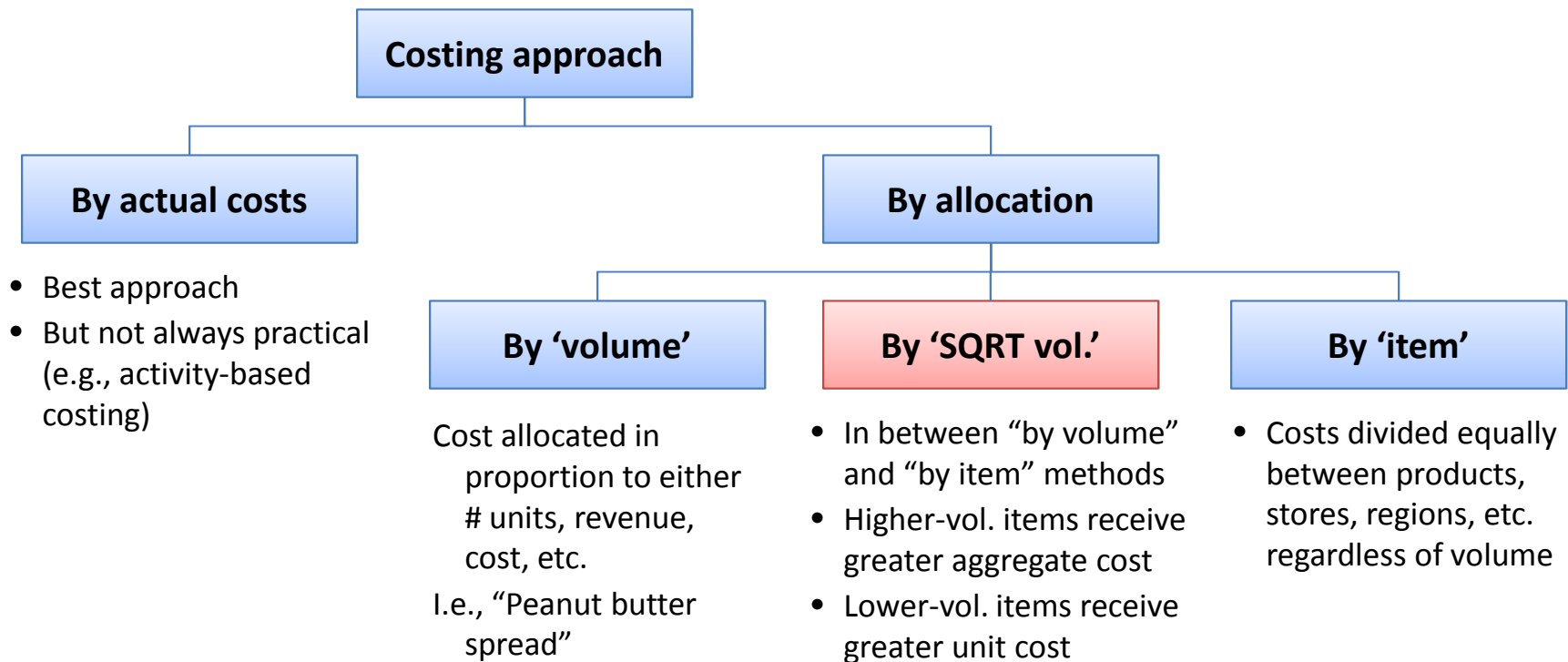
- **Cost** rises with volume but not as much as in “by volume” approach
- **Unit cost** drops off with volume but not as much as in “by item” approach

Most NVA costs fall in between “by volume” and “by unit” extremes

We see the SQRT relationship over and over



Cost allocation methods



- Most NVA/complexity costs follow the **"SQRT of volume"** relationship
- Without this tool, most companies allocate these costs using the "by volume" method, leading to **over-costing of high-volume items and under-costing of low-volume items**

Square Root Costing

Scenario:

- Product "A": volume of 1 unit
- Product "B": volume of 50 units
- Total cost to allocate = \$50

"In between" is not simply the average of the two extremes

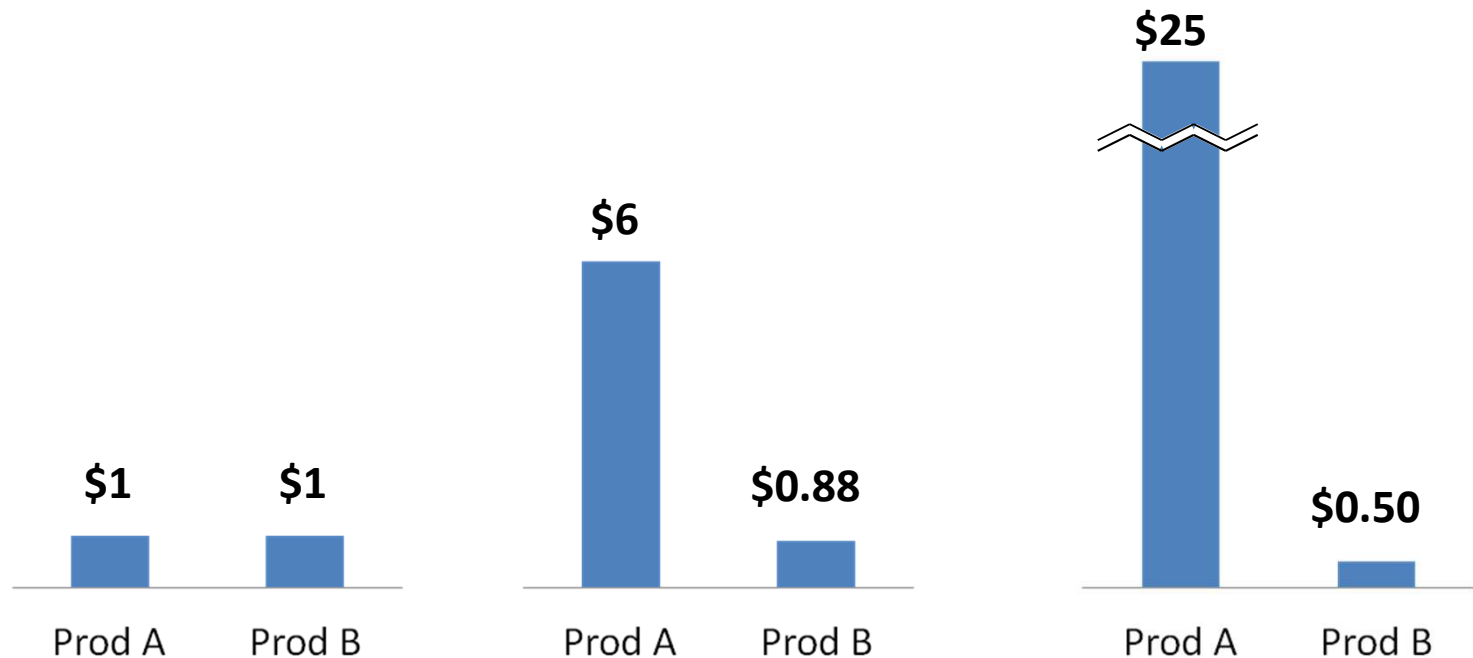
Allocation method:

"By Volume"

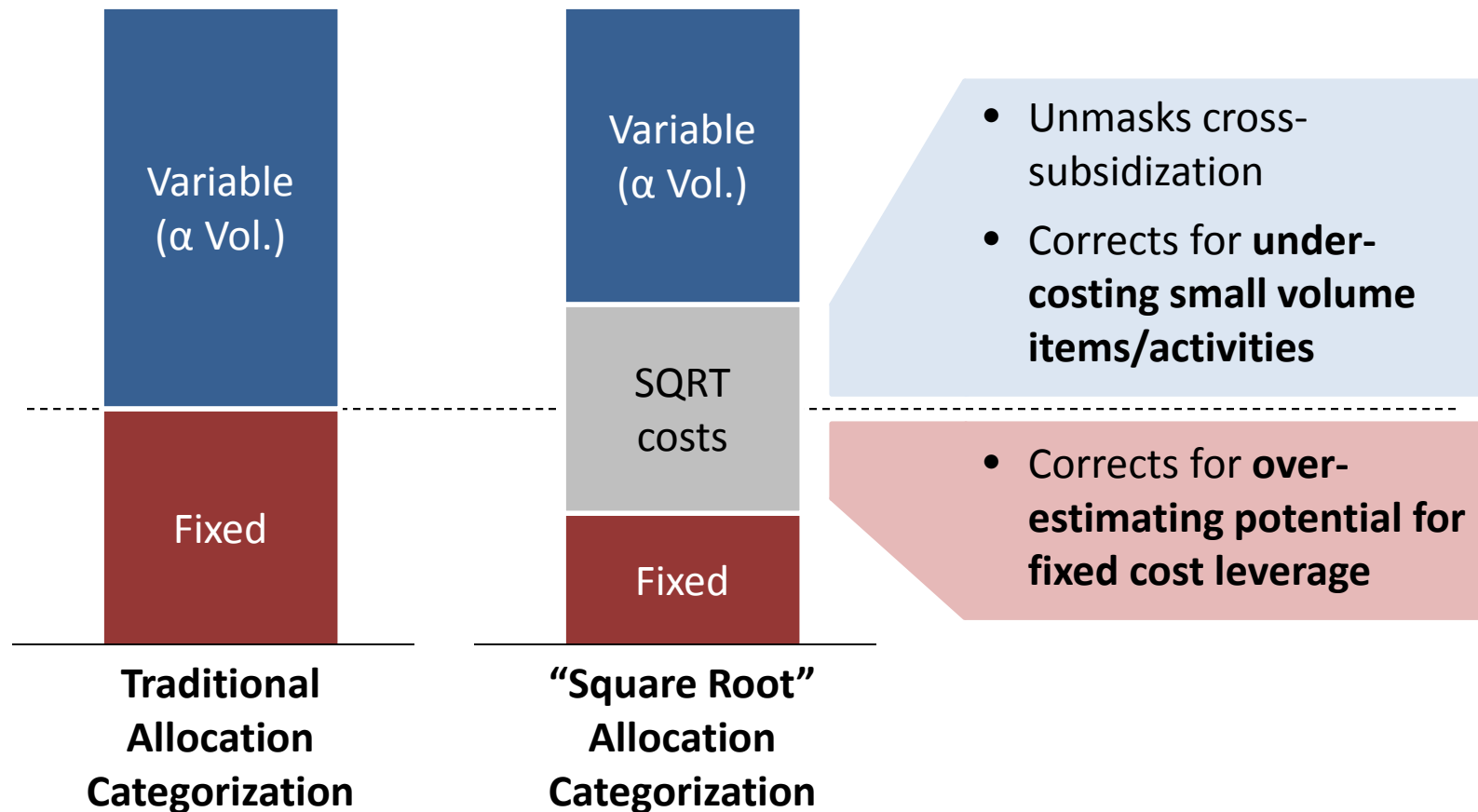
"By SQRT Vol."

"By Item"

Unit cost:



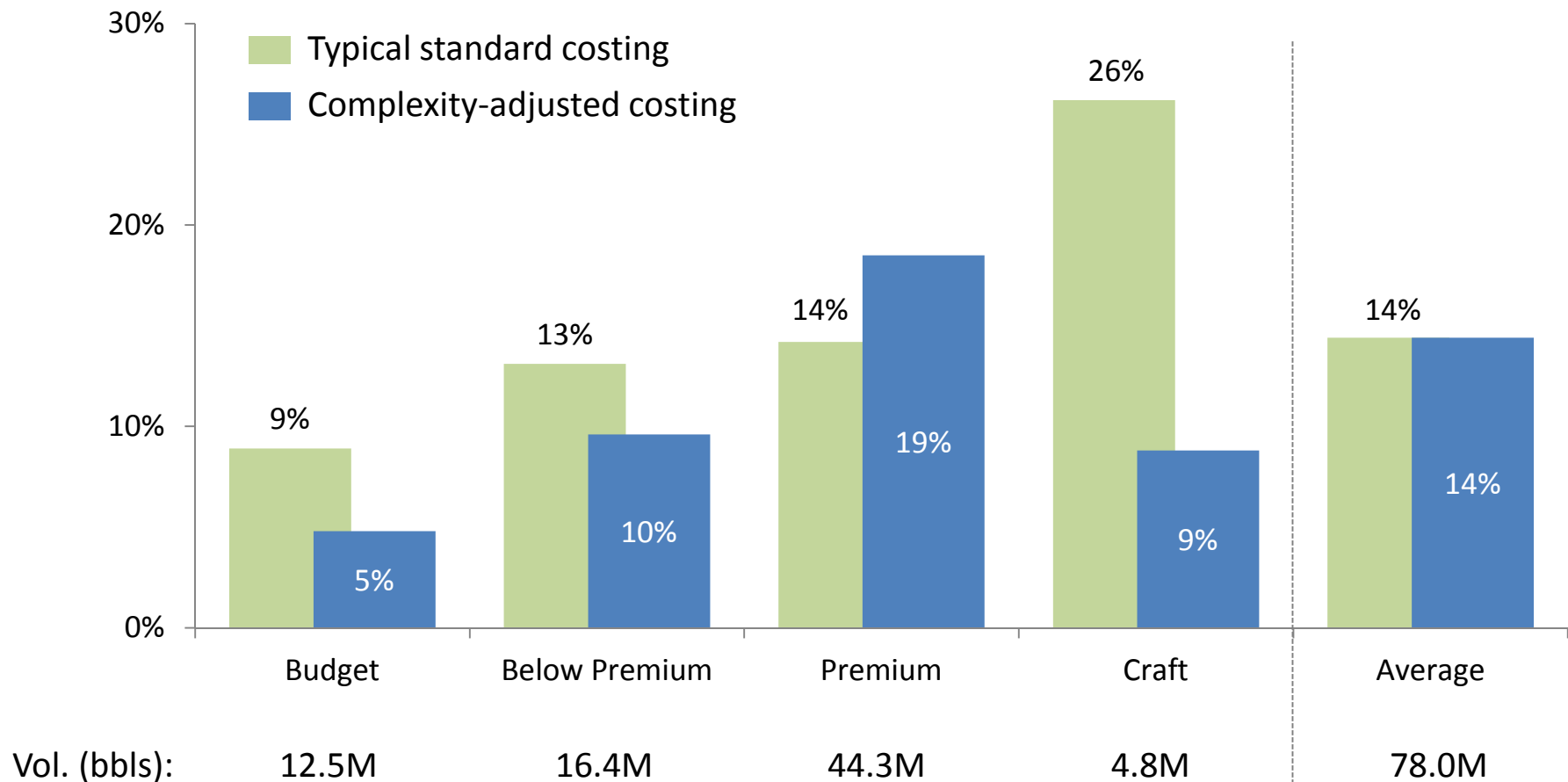
Square Root Costing involves reallocation of buckets of costs



Complexity-adjusted Profitability

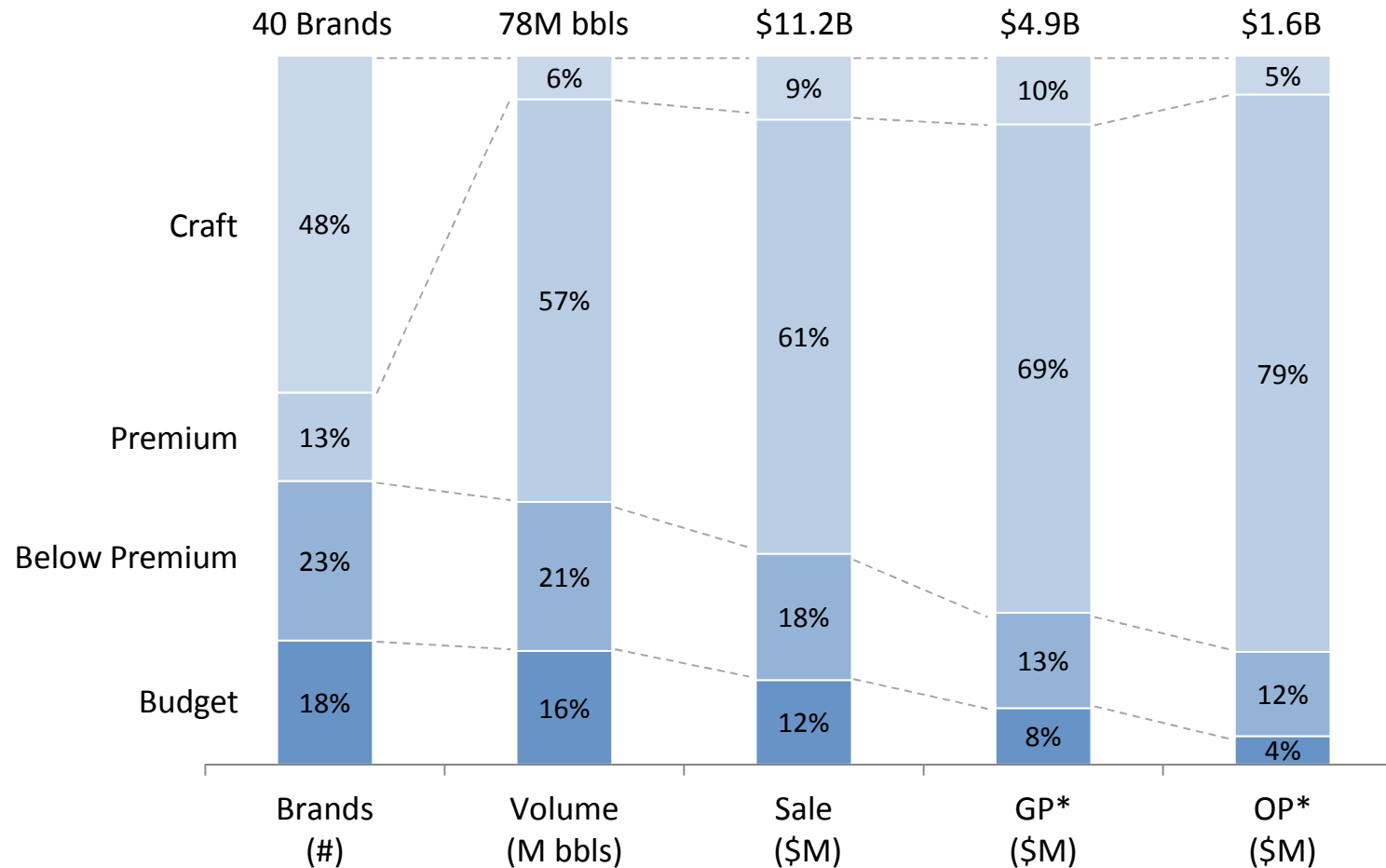
Comparison between Standard- and Complexity-Adjusted Profit

% Operating Margin



Segment Walk to Operating Profit

Segment Walk– Brand to Volume to Net Sales to OP



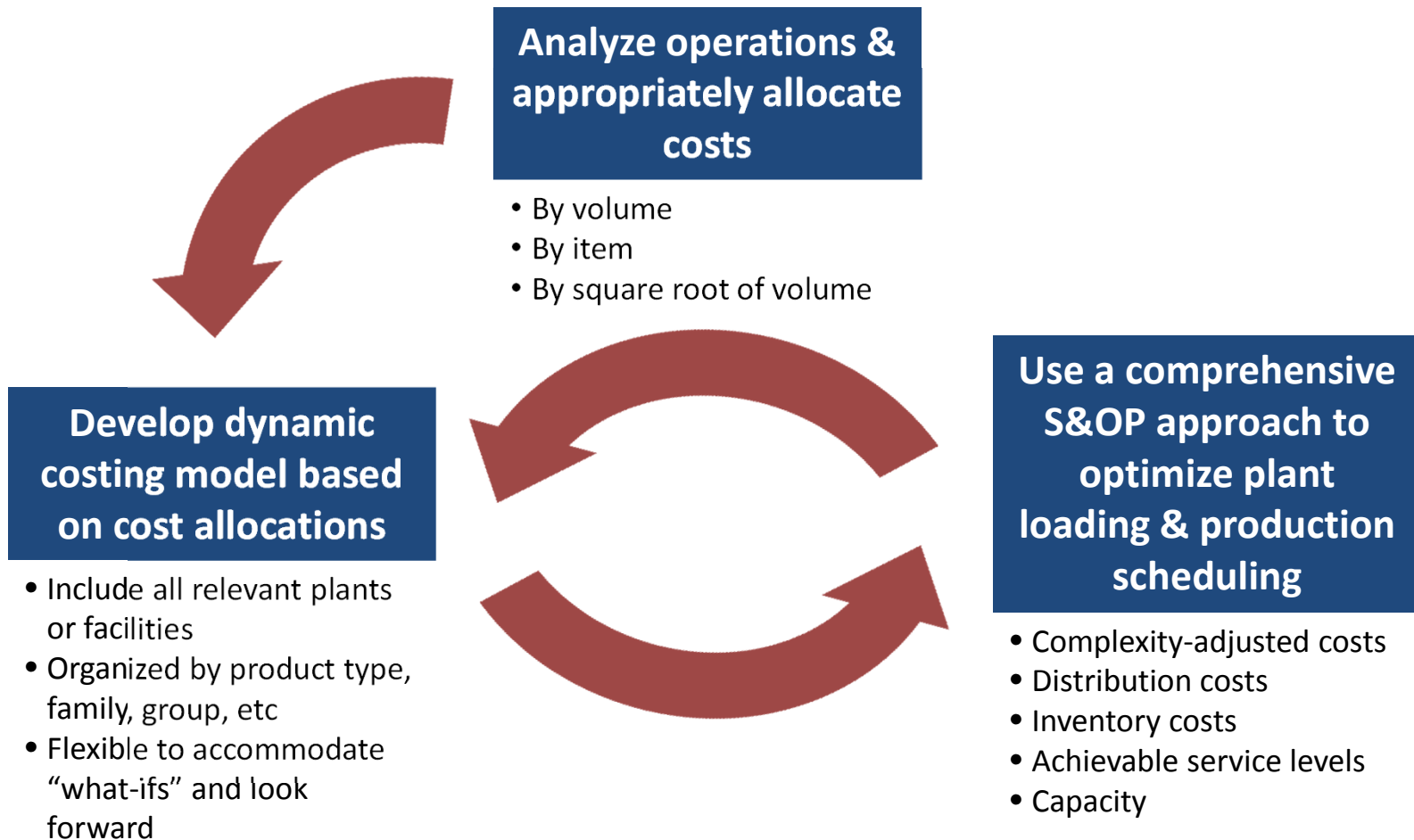
Next Steps

- Developing complexity-adjusted costs requires a deeper understanding of your operation
 - Sources of complexity
 - Drivers of complexity
 - Impacts of complexity on costs, planning, efficiency, etc
- That understanding allowed CBC to more accurately forecast costs and develop achievable plans

Case Summary

- Traditional costing suffers from significant cross-subsidization between products, activities, customers, etc.
- Square-Root Costing is a powerful costing methodology to quickly gain a truer picture of cost and profit; it allows you to:
 - Remove cross-subsidizations to get to a truer picture of costs
 - Identify opportunities for more profitable allocation of resources
 - Project cost and profitability over a range of volumes
 - Separate volume from more intrinsic profitability issues
 - Provide a more holistic view of segment economics and performance
 - Compare economics across different facilities or businesses
- Results are faster, more dynamic, and useful than Activity-Based Costing

Understanding costs and redefining the S&OP approach



Conclusion

- Don't blame the people.....blame the complexity in the process
- Better understand the *Cost of Complexity* in your business so you can
 - Remove non-value added complexity
 - Optimize total delivered cost
 - Create dynamic models

Contact us if you would like more information about how to understand the *Cost of Complexity* in your business

Email: cseifert@wilsonperumal.com
sstallbaum@wilsonperumal.com

On the Web: www.wilsonperumal.com

Blog: www.wilsonperumal.com/blog

Twitter: [@Wilson Perumal](https://twitter.com/WilsonPerumal)

LinkedIn: <http://linkd.in/10BnH1i>

Phone: (972) 716-3930