HP Printer Case

Management in Engineering

November 14, 2012

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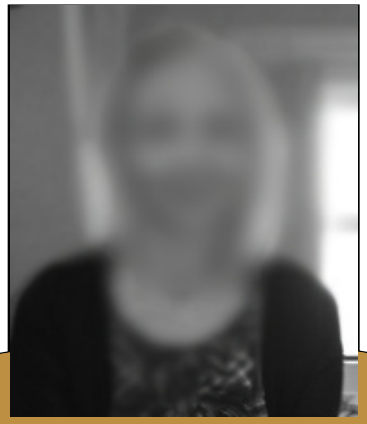
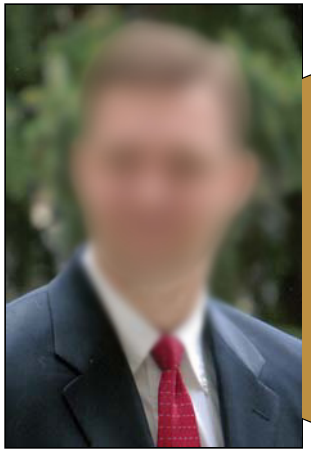
What do you recommend HP should do?

- Universal power supply
  - Yes ?
  - No ?
- Why?

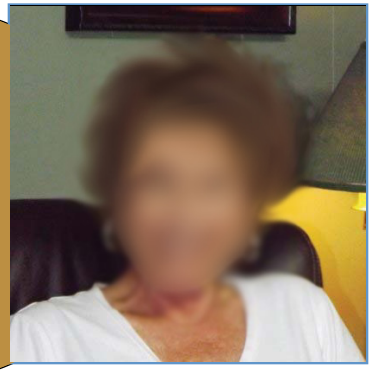
HP managers around the table



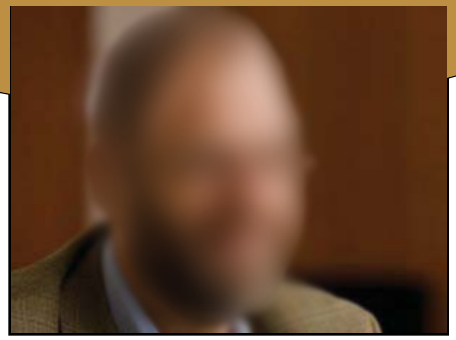
Mfg. Eng.



Controller



Mktg.



Prod. Design

Measurements and Behavior

Five functional managers are discussed in the case:

a.) Marketing

b.) Product Design & Development

c.) Finance

d.) Manufacturing Engineering

e.) Distribution

Distribution 

How are they measured? How does it influence their views on the universal power supply?

Universal Power Supply - Costs & Benefits

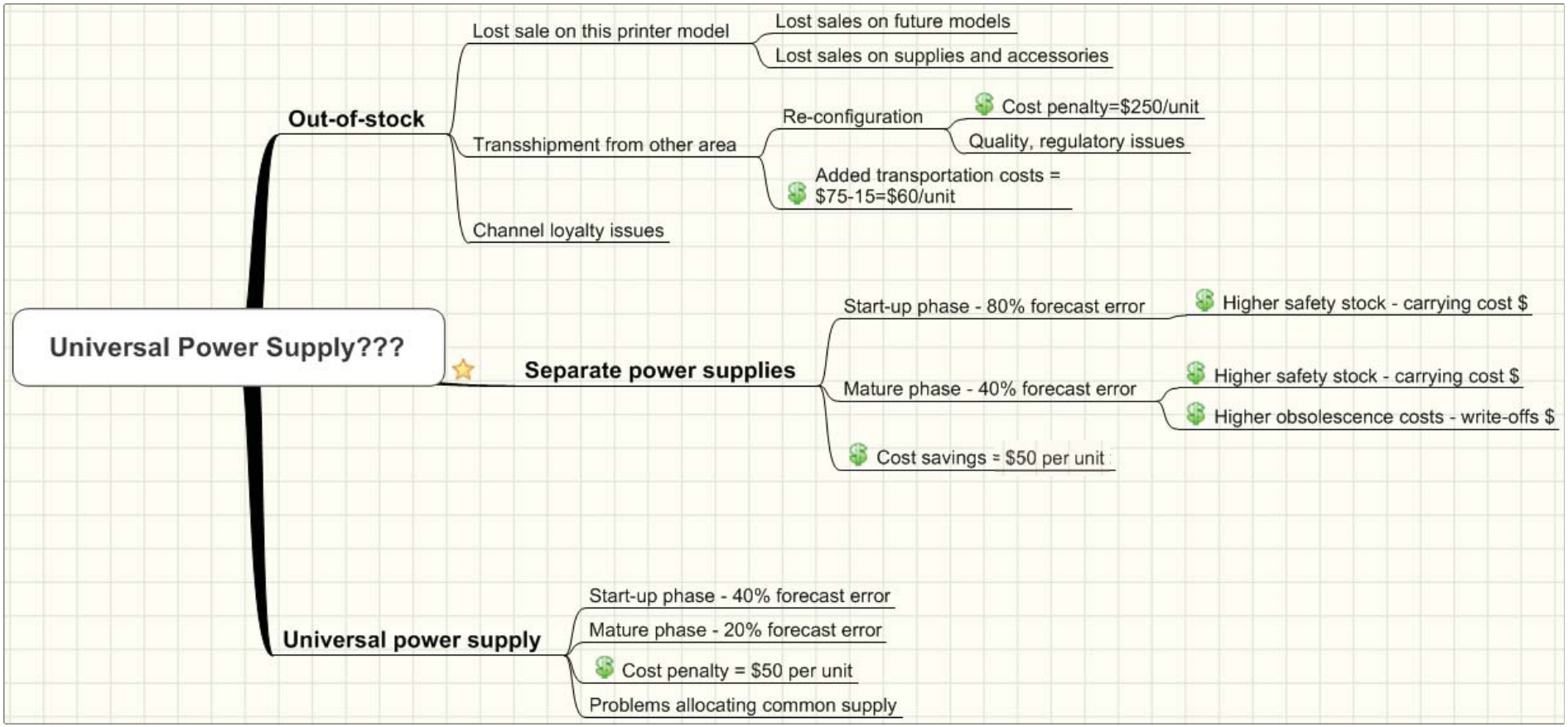
Costs

- higher cost per unit = $50
- lengthen Break-Even Time (BET)?
- problems allocating supply

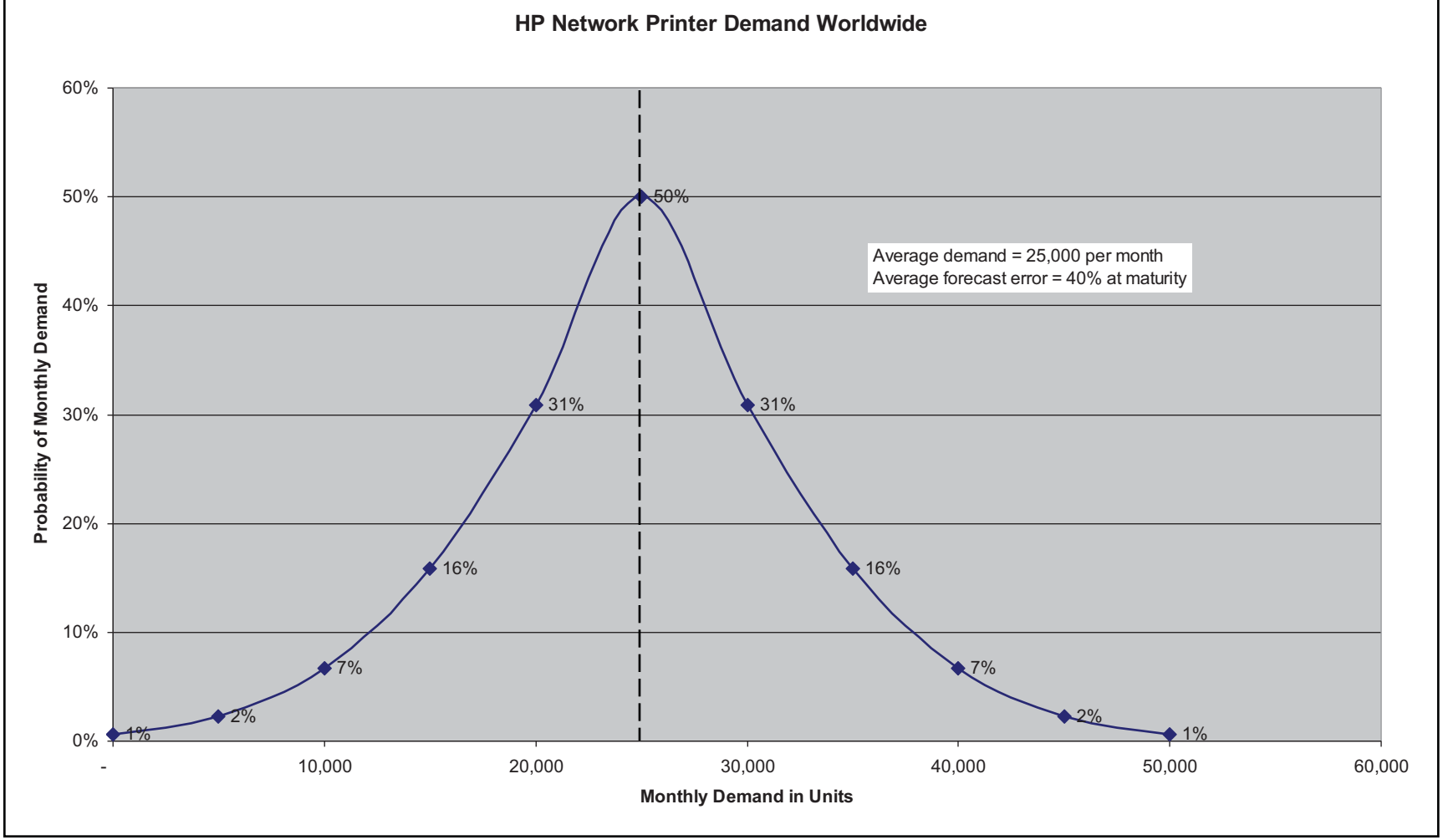
Benefits

- increase forecast accuracy
- fewer stockouts
- fewer lost sales
- less safety stock required
- fewer expedited shipments
- eliminates re-configuration work

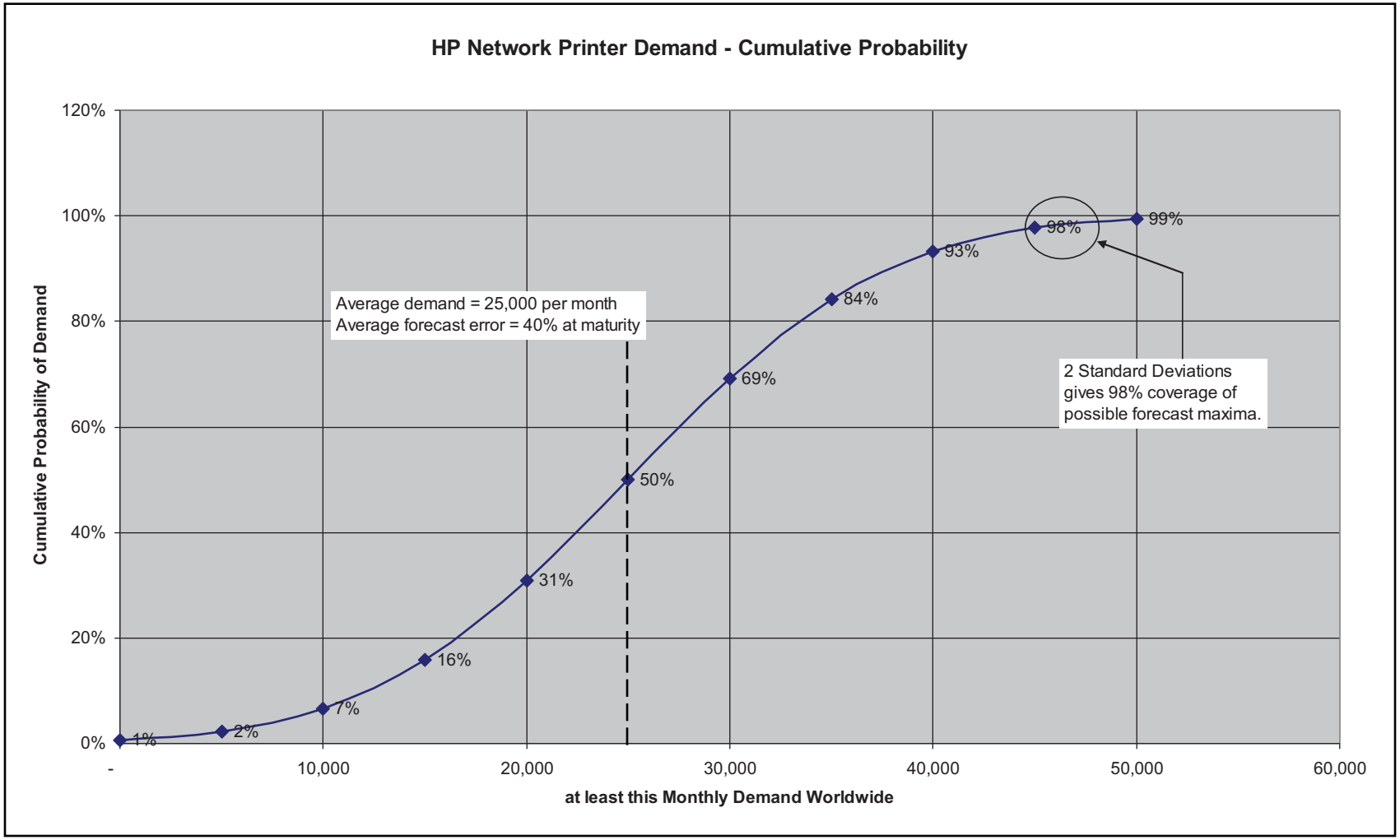
Key Consequences of this Decision



Probability of Worldwide Demand



Cumulative Demand Probability Curve



What happens to forecast error if we have a universal power supply?

The variability of the forecast errors would combine as follows:

$$\sigma_{new} = \sqrt{\sigma_1^2 + \sigma_2^2 + 2\rho\sigma_1\sigma_2}$$

where:
$\sigma_{1,2}$ are the individual product forecast error standard deviations
ρ is the correlation coefficient of the two errors

Let's say your individual forecast value is 1.0 and $\sigma_{1,2}$ both equal 0.4 (40%). If the errors are completely uncorrelated (ρ =0), then the standard deviation of the forecast error of the combined product stream would be 0.57 or 28% of the combined forecast of 2.0

If people tend to buy one product or the other, and a drop in one always occurs with a rise in the other (perfect negative correlation, ρ = -1), then the new standard deviation would be 0.0

If, say, world events always cause similar errors in both products (perfect positive correlation, ρ = 1) then the new standard deviation would be 0.80 or 40% of the combined forecast.

So you can only get better by combining products.

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At maturity the individual errors are ~40%. If the errors tend to offset each other, then the combined error will be closer to 20%.

Key Learnings for Management in Engineering

- Engineering/design decisions have major impact on operations and customer service
- Consider *all* the costs, especially when things do *not* go according to plan
- Measurements and rewards change behavior, influence how your company operates

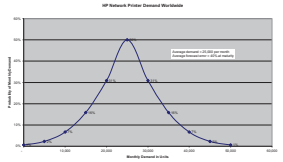
Key Takeaways

1. Forecasts are always wrong.
2. How wrong? (a) a lot, or (b) an awful lot
3. Challenge for international markets: power, localization, etc.
4. Global supply lines mean long lead times, aggravating the problem.
5. Design can have a major impact on supply chain flexibility.
6. "Hard" costs will lead you to specialized products. Inventory benefits can be very large, but are "Soft" costs.
7. Who is measured on inventory?
8. Hidden costs are often invisible, or occur much later than the key decisions which can create them.
9. Do the math. Think again about what could change the answer.
10. Remember that this is one of many decisions over time.

Key Learnings for Supply Chain Management

- Value of postponement
- Organizational roles and measurements
- International dimensions

Value of Postponement



- Reduced cycle times
- Lower forecast errors
- Smaller safety stocks/fewer stockouts
- Lower obsolescence costs
- Reduced penalty costs/profit drains
  - » Reconfiguration and extra handling
  - » Premium transportation
  - » Prevent lost revenue and profit
  - » Prevent loss of market share
- Changes during product life cycle

Organizational roles and Measurements

- Marketing
- Engineering/Design/Product Management
- Finance
- Manufacturing
- Procurement
- Logistics/Distribution
- General Managers
- Supplier/partner

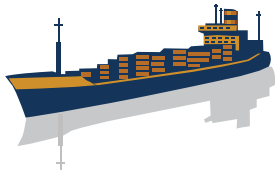
Organizational roles and **Measurements**

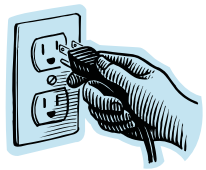
- Accountability
- BET (Break-Even Time)
- Costs
  - Product cost
  - Transportation
  - Inventory
  - Obsolescence
  - Stockouts
- Net profit
- Effects of regional P&L's

How to measure?
Who pays?

International Aspects

- Product variety
- Distance and time for supply
- Power and regulatory requirements
- Labeling, packaging
- Forecast complexities
- Supplier inflexibility
- Accountability and measurement





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