RISK MANAGEMENT for PARTS with SPORADIC DEMAND

LMI's Peak Policy™

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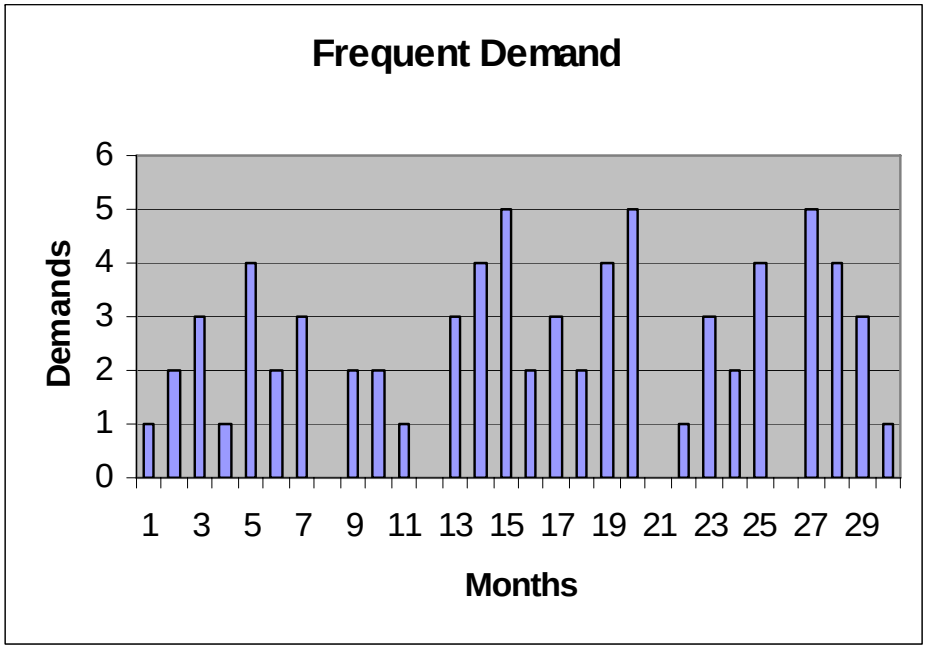
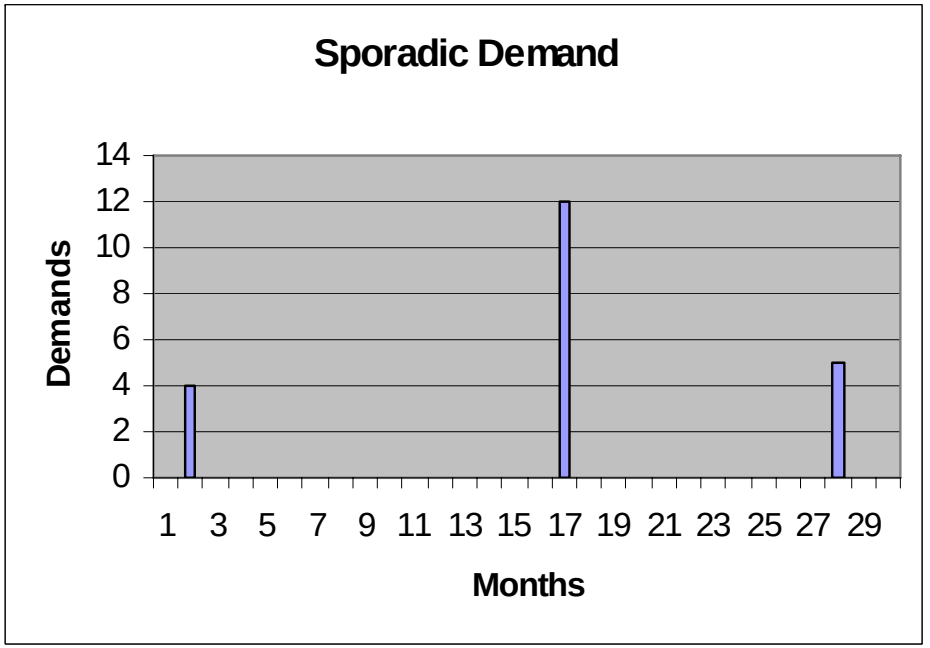
What is Sporadic Demand?

- Sporadic demand: several months to several years between demands for an item (no precise definition)





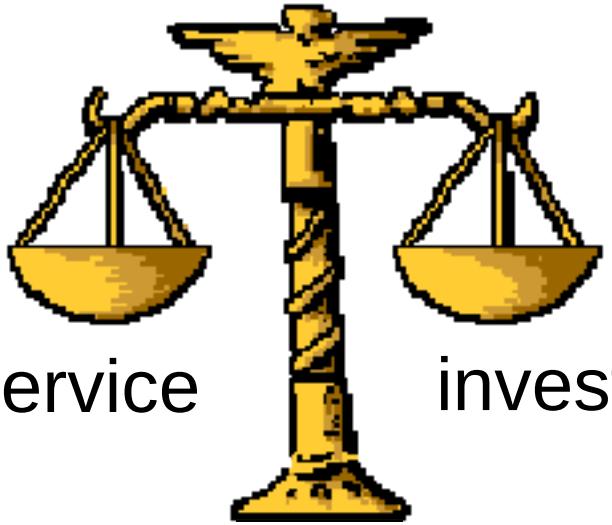
Agenda

- Problem Definition
- Standard approach
- Why it doesn’t work
- An alternative idea
- Peak Policies
- Benefits
- Status and next steps

Problem Definition

- Risks for critical parts with sporadic demand:
  - overstock, and have too many $ tied up in inventory, OR
  - stock too little, and have critical systems down for lack of parts

The Challenge:



service investment

Problem Definition

- Focus on consumable service parts
- Two questions to answer:
  - when do we order parts?
  - how much?
- Our answer is an “ordering policy”—what type should we use?

Standard Approach: (s,S) Policy

- For frequently demanded parts, a typical reorder point is:

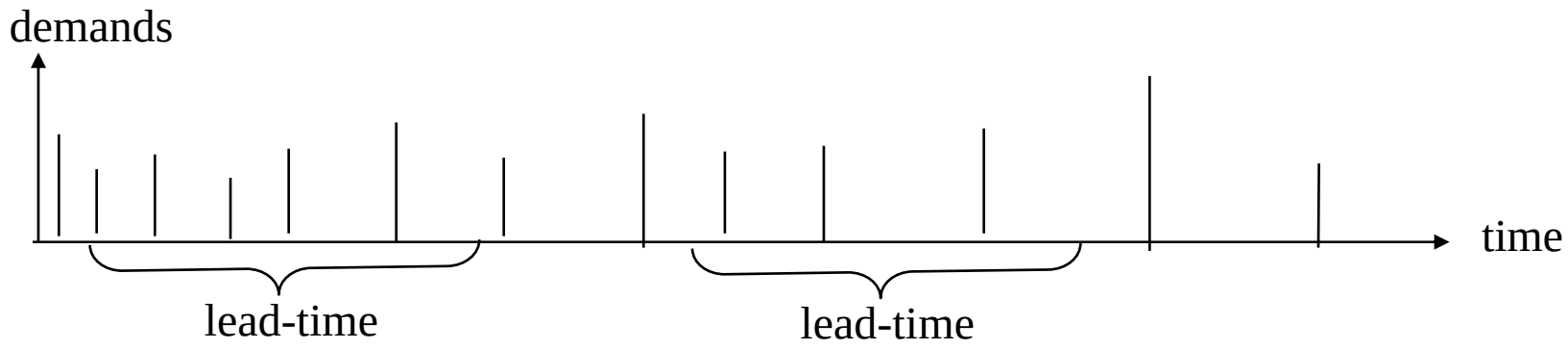
  s = ROP = (forecasted leadtime demand) + (safety level)

- Assume a probability distribution for leadtime demand
- Optimization of safety levels across items:
  - maximizes service level for a given investment, OR
  - minimizes investment for a given service level
- Requisitioning Objective S = RO = ROP +Q
  - Q is often an economic order quantity, or is based on a coverage period (e.g. estimated 3 month's worth of stock)

Standard Approach: Leadtime Demand

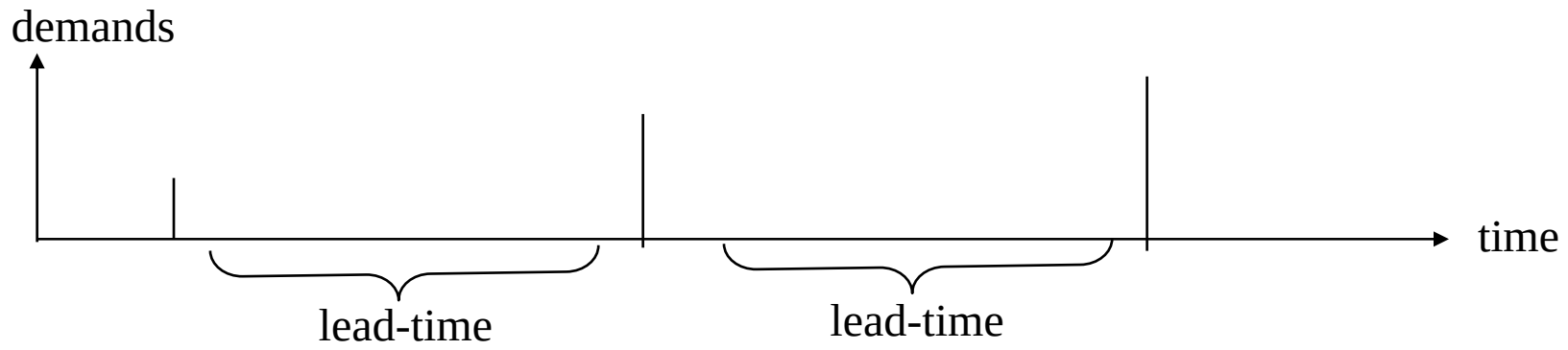
Frequently demanded item:

Leadtime demand typically >0



Sporadic demand item:

Leadtime demand usually =0



Why It Doesn't Work

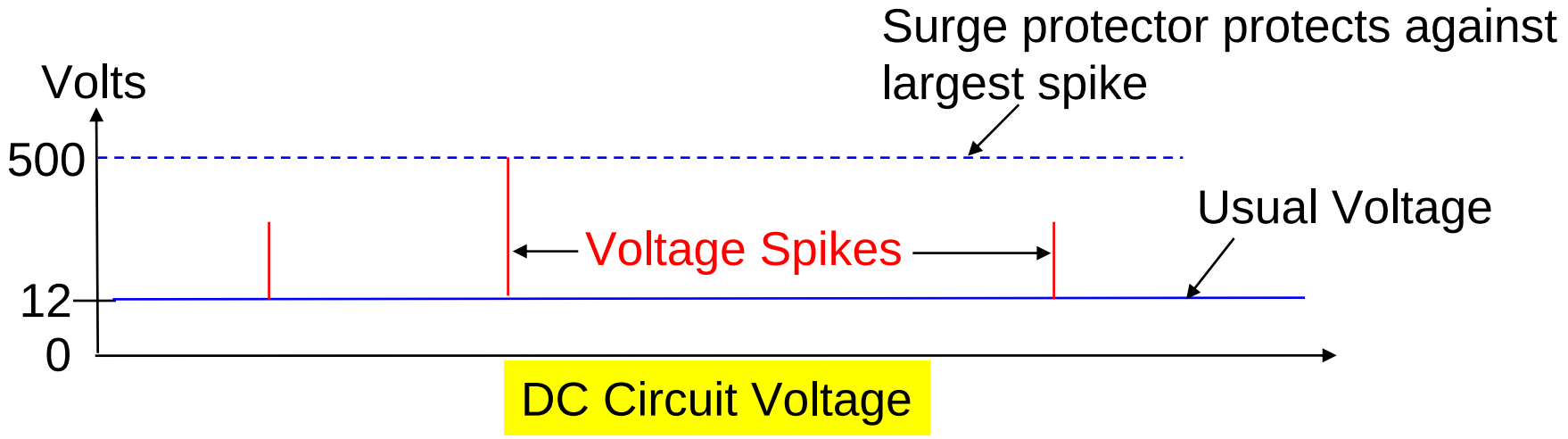
- For 300,000 sporadic demand parts, we found leadtime demand was zero almost 95% of the time
- Zero is the best leadtime demand forecast—this would be the mean of the distribution
- Variance estimates at least as difficult as the mean
- No theoretical distribution fits leadtime demand
- Too little data for bootstrapping

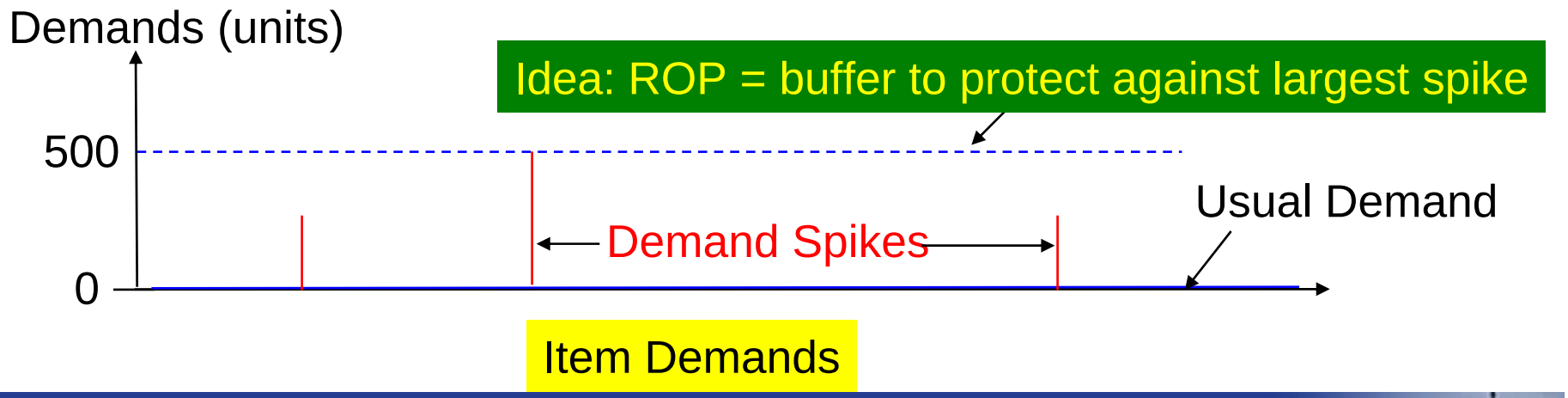
An Alternative Idea

- Since a sporadic demand item experiences many leadtime periods with no demand, we might *think of "no demand" as its normal state*, punctuated by occasional spikes

- Idea: How about a policy that seeks to offer protection against those spikes, like a "surge protector" for line voltage?

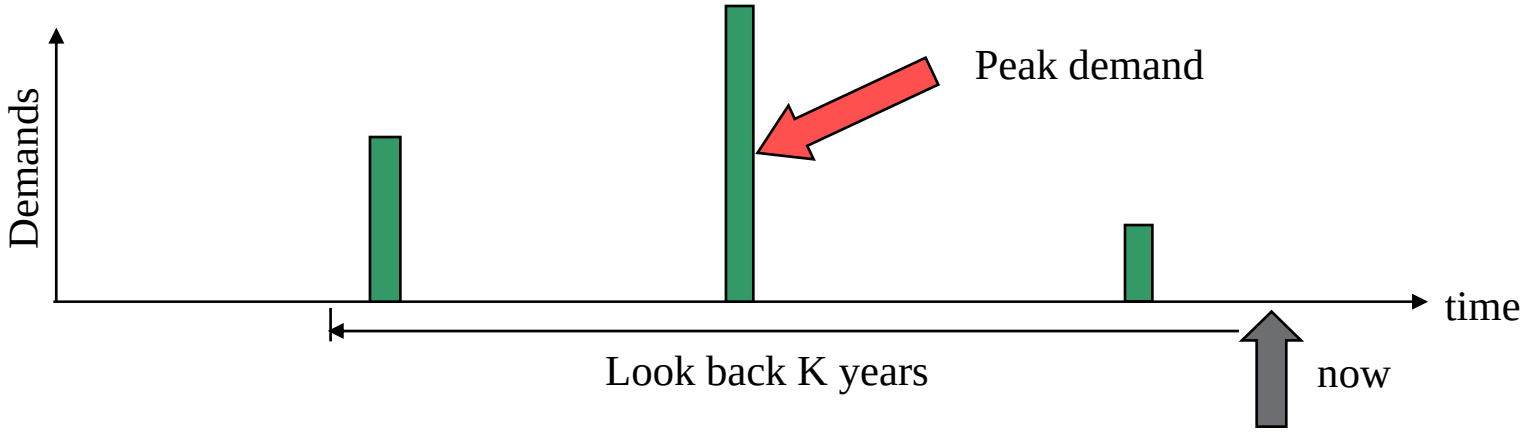
An Alternative Idea—
Surge Protector Analogy





Peak Policy*—Elements

- Peak demand—largest period demand for last K years (look-back)
- ROP = (Price-based multiplier) x (Peak demand)
- Price-based order quantity Q
- RO = ROP + Q



** Peak Policy is a trademark of the Logistics Management Institute*

Peak Policy—Development

- Start with policy goals
  - e.g. reduce wait time for same inventory $
- Choose candidate policy
- Stress test against many demand scenarios
  - use specialized simulation (FINISIM)
- Refine policy settings based on results; test again
- Iterative process converges to policy that meets goals

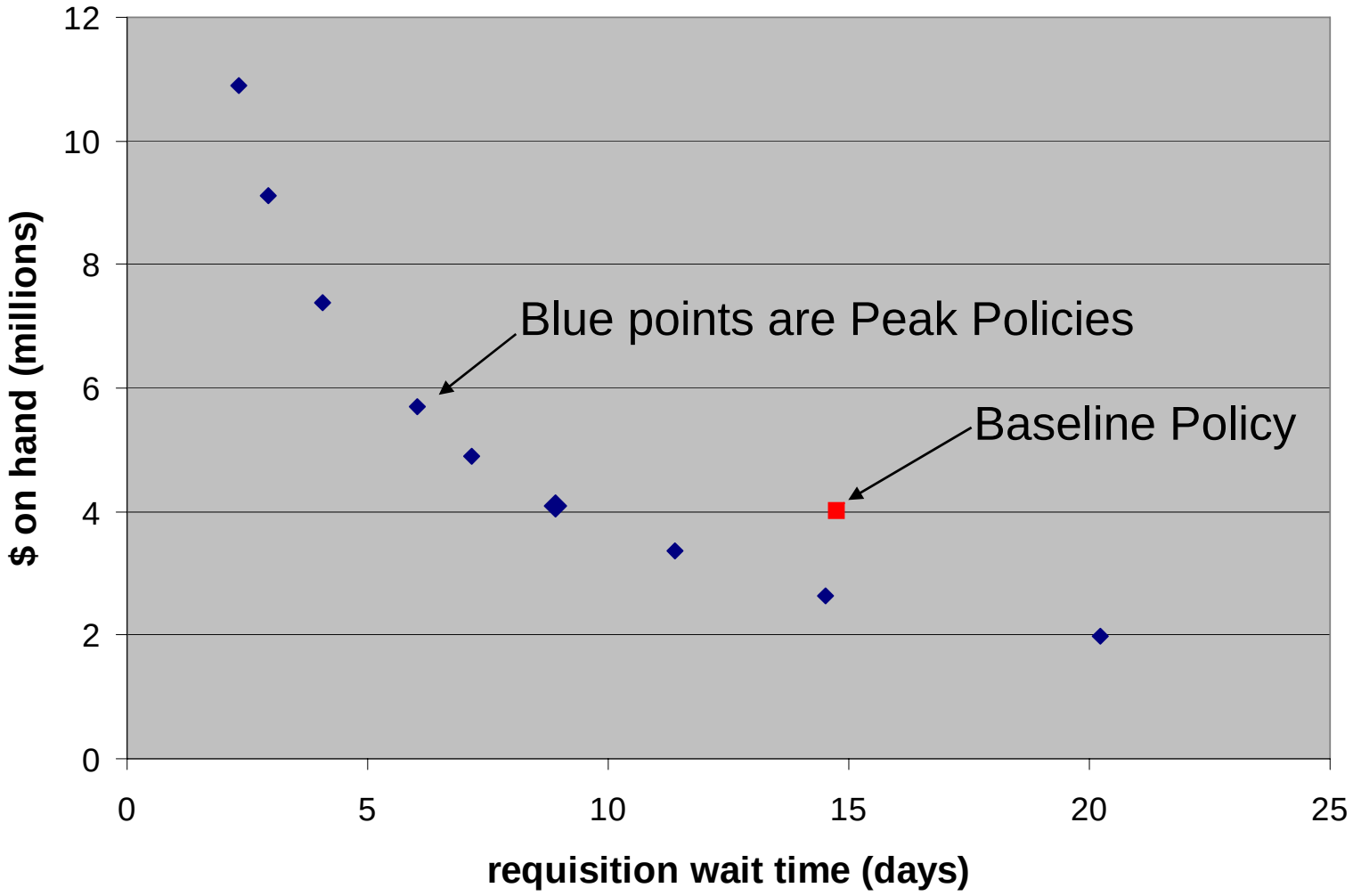
Projected Benefits—
Peak Policy offers three options (pick one):

- Reduce customer wait time 20% to 40%
- No long term increase in procurement workload or inventory investment, OR

- Reduce inventory investment 10% to 15%
- Maintains or improves wait times and fill rates, OR

- Reduce procurement actions 10% to 20%
- Maintains or improves wait times, fill rates, and inventory investment

Can now trade off investment vs service level—new for sporadic demand parts



Status and Next Steps

- DLA implementing Peak Policy on parts for 8 high-priority weapon systems
- LMI extending policy to reparable parts
- LMI considering automated policy generation

Credits

- Research supported by DLA's Weapon System Sustainment Program

Reference

- Bachman, T. "Reducing Aircraft Down for Lack of Parts with Sporadic Demand," *Military Operations Research*, Volume 12, No. 2, 2007.

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