

Toward a cost model for system and network administration

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Approaches to measuring management effectiveness

- Maturity (Kubicki, “The system administration maturity model,” *Proc. LISA 1993*)
- Cost versus value (Patterson, “A simple model of the cost of downtime,” *Proc. LISA 2002*)

Process maturity (a system or network administrator's view)

- Level 0: **ad-hoc**
- Level 1: **documented**
- Level 2: **reproducible**
(Can take any system, throw it out of a second story window, and replace it within an hour)
- Level 3: **robust**
(Can take any *system administrator*, throw him or her out of a second-story window, and replace him or her in an hour!)

Process maturity is

- A good thing, but relatively abstract:
- Tangentially related to value and cost
- Difficult to justify, even in software engineering where it arose

What is optimal management?

- Maximize: value - cost
- Subject to:
 - cost < budget
 - value > QoS commitment
- Value: services rendered \approx revenue
- Cost: operations, service contracts, downtime, penalties, etc.

Looking deeper at cost and value

- downtime & QoS violations cost real money
- Patterson 2002: cost of downtime
 \approx revenue lost + work lost
 \approx downtime \times (average revenue lost per unit time + average work lost per unit time)

What is “best”?

- Best practices are site-relative
(Couch et al, “Toward a cost model for system administration,” *Proc LISA 2005*)
- Site complexity can be defined in terms of **uncertainty** in the troubleshooting process

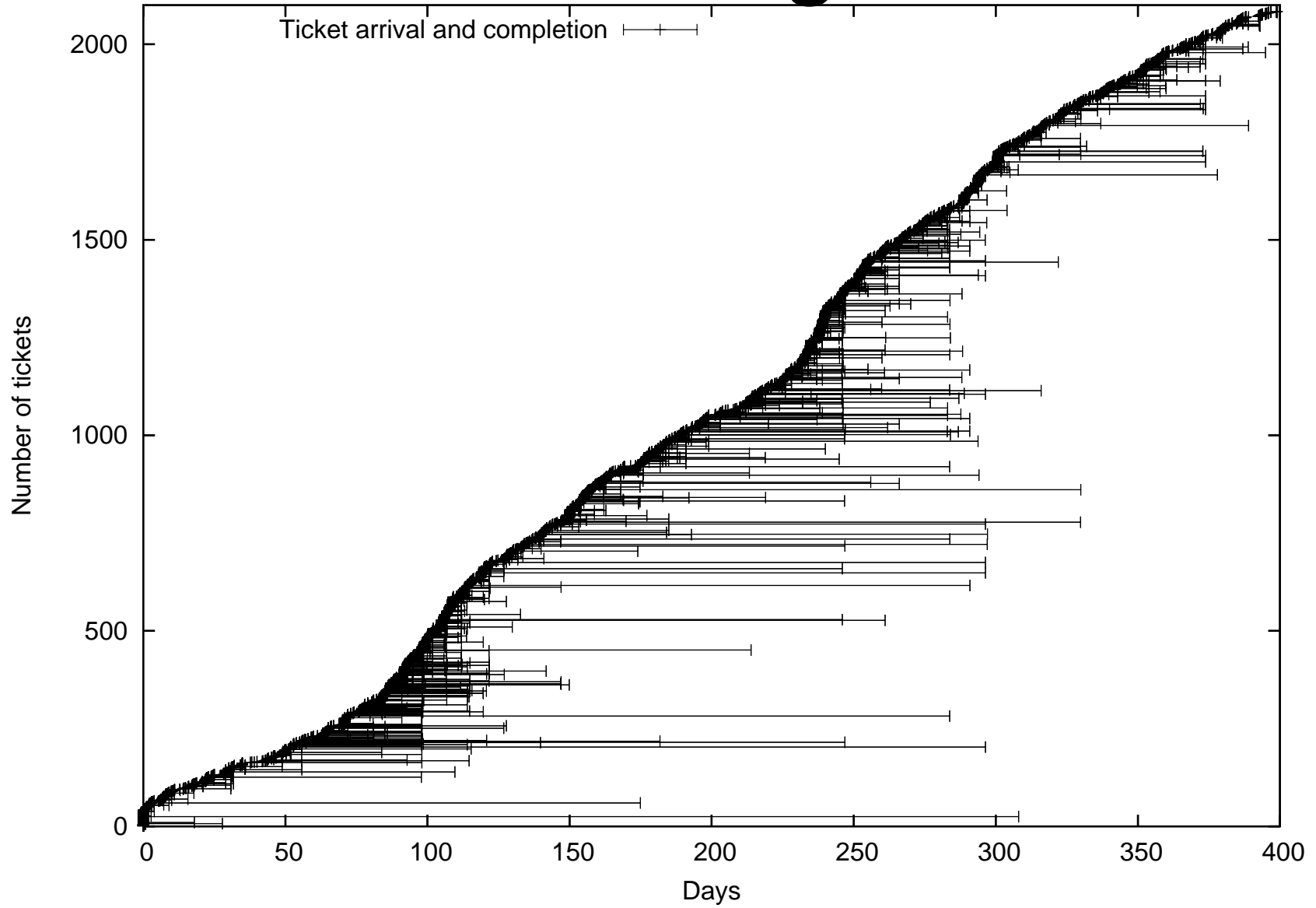
What is optimal?

- Can't measure whether value-cost is maximum.
- Can measure whether changing parameters makes it better or worse.
- One way to estimate: **simulation.**

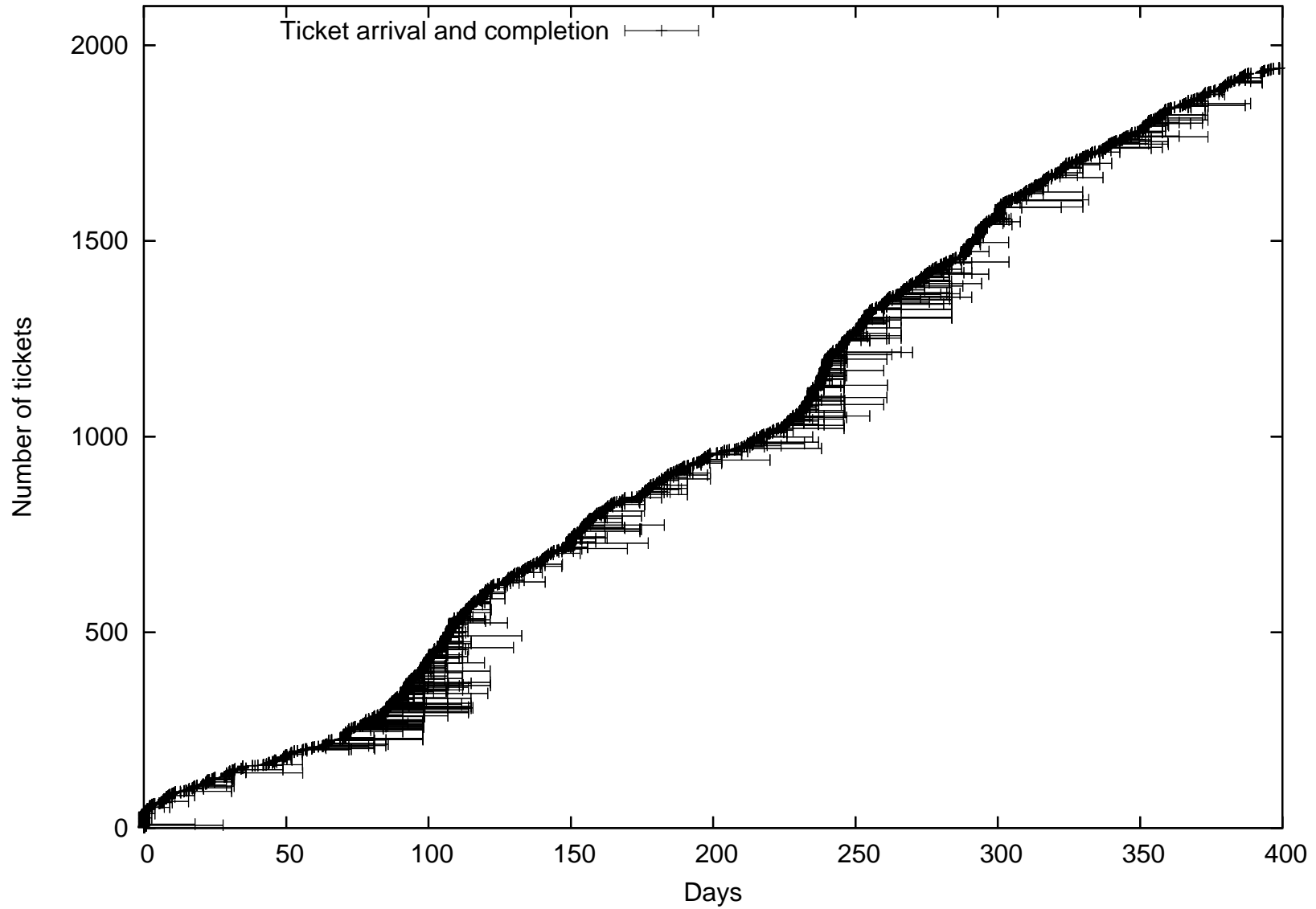
Key to simulation: site complexity

- A function of **uncertainty** in the troubleshooting process
- **Low complexity**: predictable outages, most common remedy usually works
- **High complexity**: unpredictable behavior, need for trial and error => longer waits, less predictable costs for contingencies
- Site complexity is really **entropy**.

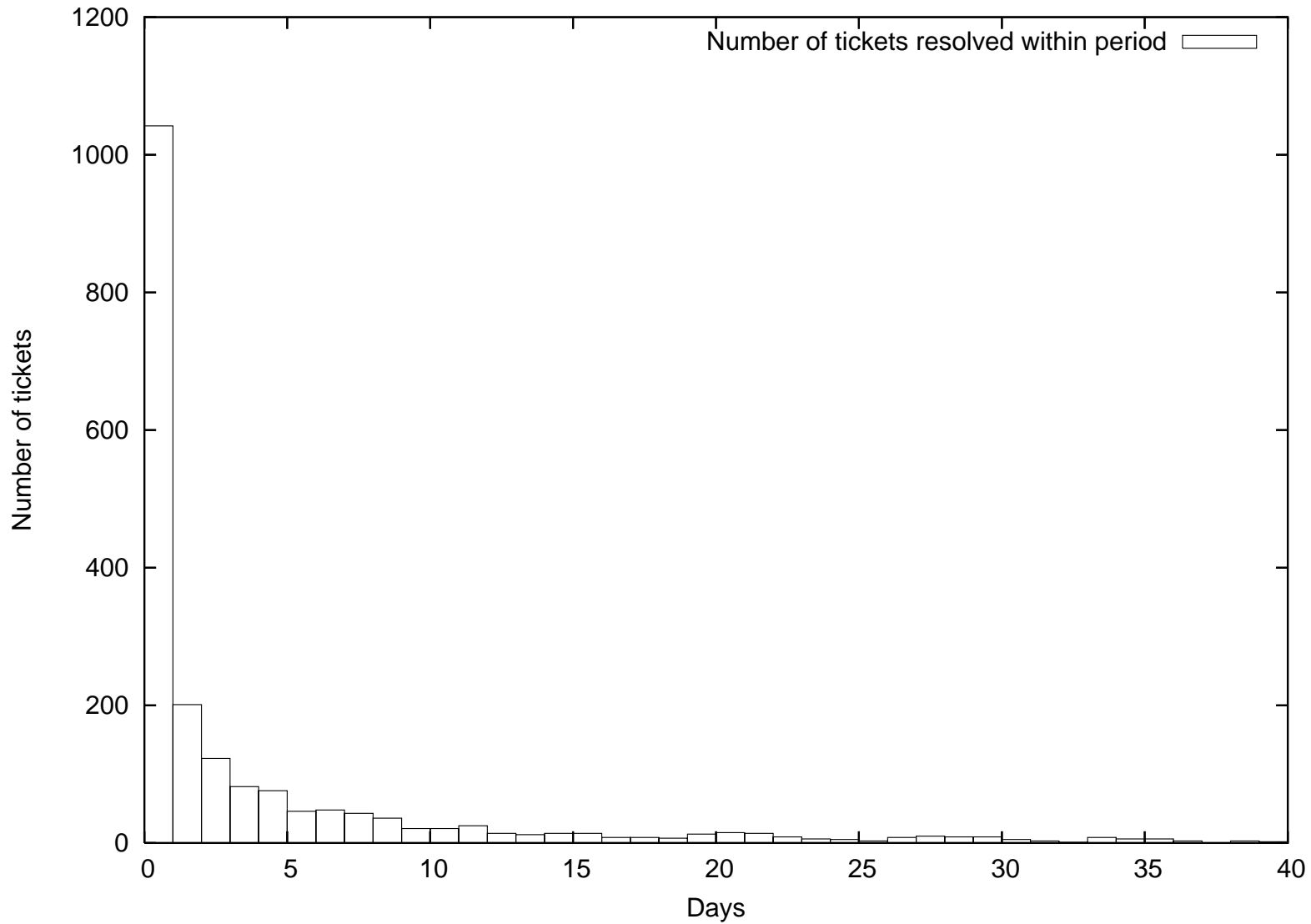
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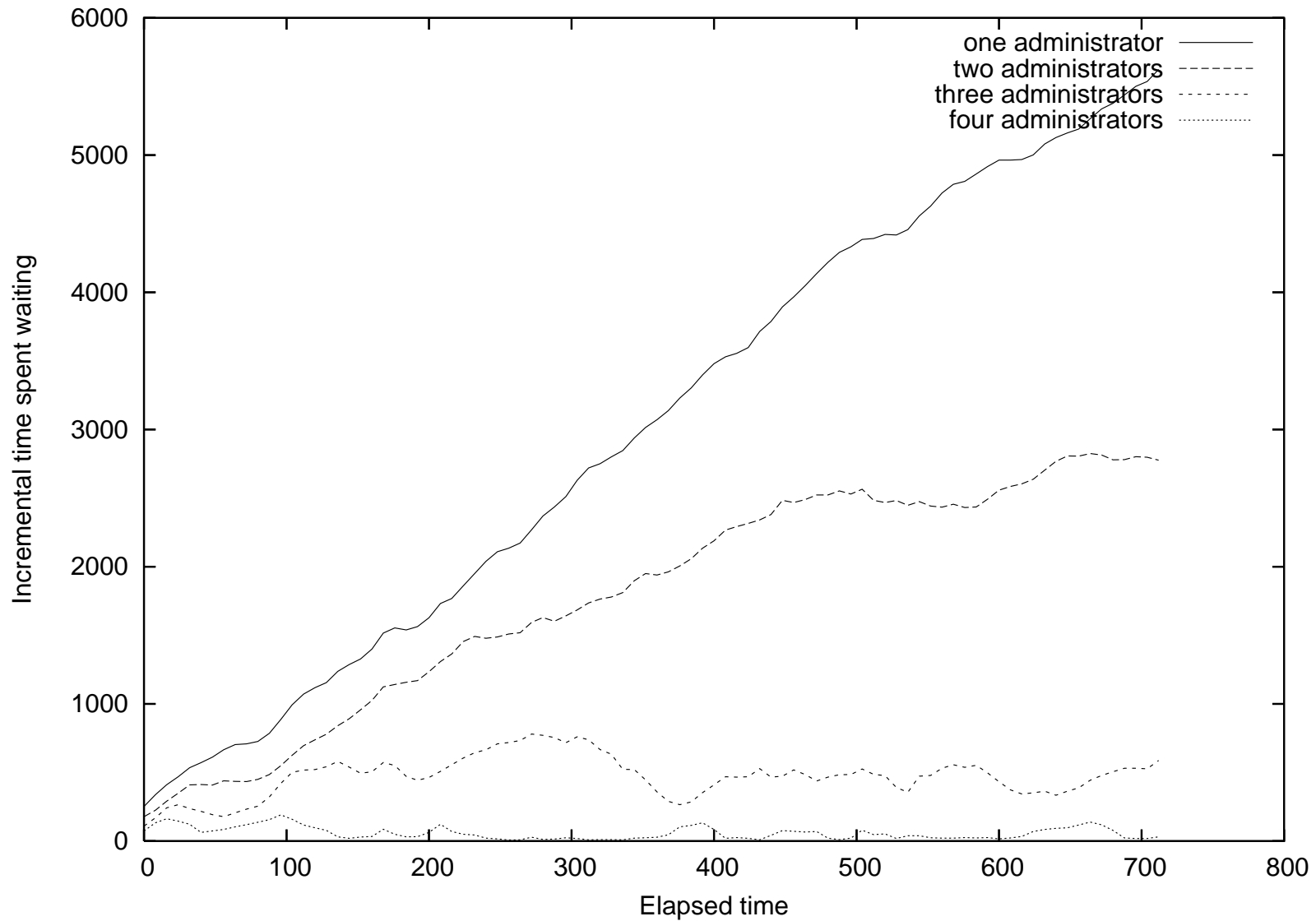
Applying filters



Service time distribution



Simulating outcomes



Summary

- Capabilities maturity is abstract.
- Value – cost is concrete.
- Management strategy is optimal if changing anything decreases profitability.
- We can justify capabilities maturity via direct measurement and simulation.