Self-Managing Systems: Desirable Goal Or Fool's Errand?

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18-May-2005

What is Self-Management?

- **Working definition**
  - Automation of management

18-May-2005

Goals

- **Reduce cost**

- **Improve QoS**
  - Performance, availability, security, installability, …

- **Improve responsiveness to business needs**

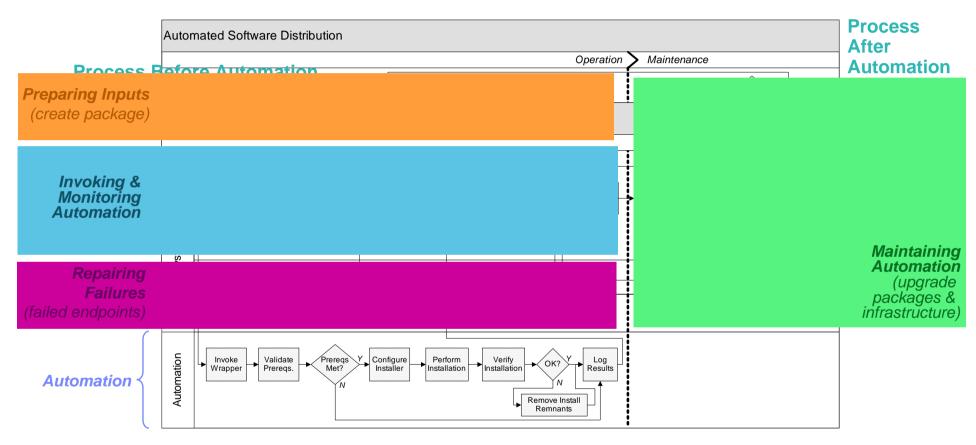**Assumptions**

      Self-management reduces human intervention

      Human intervention causes

            high cost, poor QoS, and long time to value.

Management Automation Can <u>Increase</u> Costs:
A Software Distribution Example

Process After Automation

Automated Software Distribution

Operation | Maintenance

Process Before Automation

Preparing Inputs
(create package)

Invoking & Monitoring Automation

Repairing Failures
(failed endpoints)

Maintaining Automation
(upgrade packages & infrastructure)

Automation

Automation: Invoke Wrapper → Validate Prereqs. → Prereqs Met? —Y→ Configure Installer → Perform Installation → Verify Installation → OK? —Y→ Log Results

Prereqs Met? —N→

OK? —N→ Remove Install Remnants
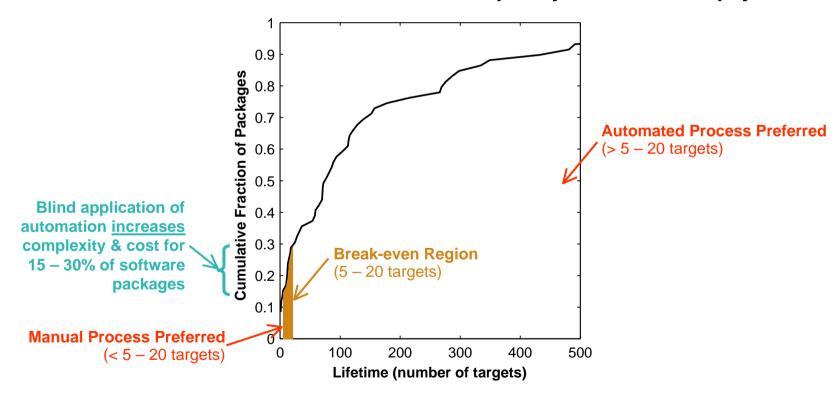
- **Observations**
  - Process-based viewpoint reveals full impact of automation on complexity
  - If automation is short-lived, net complexity may actually <u>increase</u>

Shaded boxes are per-target activities

Submitted to HotOS 2005

Example Cont'd: Impact of Automation Lifetime

- **For software distribution, lifetime is number of targets a software package is distributed to**

- **Lifetime determines whether increased complexity of automation pays off**

Blind application of automation <u>increases</u> complexity & cost for 15 – 30% of software packages

Break-even Region
(5 – 20 targets)

Automated Process Preferred
(> 5 – 20 targets)

Manual Process Preferred
(< 5 – 20 targets)

Cumulative Fraction of Packages

Lifetime (number of targets)

Conclusions

- **Self-management (automation of management)**
  - Eliminates some manual processes
  - Adds new manual processes that often require different skills

- **Self-management is desirable if**
  - Sufficient net reduction in manual effort
    - Number of iterations completed in each invocation of the automation
    - Difficulty of preparing the inputs for the automation
    - Frequency of exceptions in the automation
  - Have the skills needed to do the new manual processes

- **Need an adoption model for self-management**
  - Defines readiness of customers for self-management based on the state of
    - People skills, processes, tools
  - Specifies a sequence of steps that transition customers from current state to desired state