Inevitability of Operational Automation
Service Management Strategies, Operations Strategies
Glenn O'Donnell

Like many other human endeavors before it, IT operations are increasingly employing automation to reduce costs, accelerate process execution, and minimize errors. To some IT professionals, this trend is an alarming threat to their value and ultimate job security. Those in this group will resist automation efforts; however, resistance is futile. Commodity IT functions will be automated with absolute certainty. IT operations professionals must assume more strategic responsibilities to preserve their value to the business.

As IT operations continue to mature, many operational functions will commoditize. Immature operations are excessively manual, which presents a costly model to the business. Technology developments and the emergence of operational process best practices (e.g., META Group's Process Maturity Model, ITIL) are offering IT organizations (ITOs) the tools to automate operations. The resulting cost savings will be profound. Just as automation revolutionized manufacturing and agriculture, automation will dramatically revolutionize IT operations during the next decade.

This automation concept is not new, but its realization within the IT domain is a refreshing deviation. Infrastructure and application management (IAM) tools have already proven valuable in automating the most mundane operational tasks (e.g., data collection, reporting, job scheduling, software distribution). During 2003-06, more advanced IAM tools will mature to automate operational tasks currently requiring a high degree of technical skill (e.g., network configuration management, server administration). During this same period, process automation tools will expand on current nubile products to enable smooth, iterative process refinement (e.g., capacity management, application optimization incorporating feedback from management data). The rapid growth of Web services and grid computing will accelerate the need for such advanced automation through 2007. By 2010, underlying management technologies will enable self-regulating infrastructure behaviors beginning to resemble natural organisms (see SMS Delta 1026).

Tactical automation will mature sooner than robust process automation because it is easier (see Figure 1), but it will also incite the most controversy. Some staff currently performing these tactical functions (e.g., systems administrators, network administrators) will feel devalued and threatened. The truth is that these fears are somewhat justifiable. Less strategic positions will indeed become obsolete. Strategic positions drive continued innovation and are, therefore, less vulnerable to displacement (see Figure 2).

Some will attempt to scuttle tactical automation efforts; however, such resistance is a guaranteed failure. Automation is an inherent component of progress. With business progress driving the ITO to higher efficiency, automation is unavoidable. All must view automation in this context and choose to contribute to the development and cultivation of automation efforts. Those who oppose these efforts will become pariahs of the organization.

ITOs have become overly reliant on high-skilled professionals to perform repeatable tasks. This manual effort is a gross waste of costly resources. Economic realities will force IT organizations to re-evaluate this reliance on experts, and the conclusions will drastically reshape the organization's use of skilled professionals. Granted, high technical skill will always be a hallmark of the IT organization, but skill requirements are constantly in flux. Many of our most talented experts waste time

> *META Trend: Through 2003-05, real-time status reporting will be demanded in context (e.g., performance versus the SLA — not element level) and include extended metrics (e.g., financial analysis, mean time to restore service) that drive abstraction technology. Through 2005, tools targeting service-level "everything" (reporting, verification, management, etc. — SLx) will remain immature and fragmented. During 2006/07, SLx technology will begin to mature (demanding XML-based data integration), supported by common metrics.*

performing everyday tasks that can be performed by a less skilled person, if given the right automation tool (or even automated completely). This liberates the experts to tackle challenges that are more strategic and better utilize their unique strengths. The business benefits from lower costs, and the experts benefit from higher job satisfaction. Some of these improperly used experts suffer frustration and burnout because unexciting chores hamper their desires to optimally use their talents.

Automation encourages multi-tiered support structures that have proven successful for incident management and cost optimization. Command center structures are a good example (see SMS Delta 1088), where the lower support tiers triage the majority of incidents by using automation tools. High-skilled personnel are better for addressing more troublesome incidents and long-term problems in higher support tiers. This tiered structure is a logical order of skill utilization, process optimization, and service delivery. Without automation, the effectiveness of the tiered structure is elusive. There is little or no order, just abysmal service and chaos dominated by interrupt-driven workflow.

Instead of pursuing automation with blind ambition, enterprises must balance the cost of automation systems with the benefits gained. ROI must be analyzed carefully before deploying automation solutions (see SMS Delta 1055). In many cases, ROI will be easily justified, but there are no success guarantees without this analysis. Organizations must also consider their existing operational maturity state. Mature operations boast strong process adherence, which enables better automation ROI. Immature organizations will merely accelerate the execution of flawed processes and tasks.

Several tools and enabling technologies already exist for more advanced automation (e.g., Opsware, NextNine, MetiLinx, Terraspring, Vieo, Euclid), but barriers to automation will hamper rapid adoption in many situations. Immature operations will fail to adequately scope automation efforts by omitting key components for configuration and other management functions. In addition, as vendors consolidate tools, users should beware of the re-emergence of frameworks that failed so dramatically in the late 1990s. Ambitious single-vendor solutions can be unwieldy, with cumbersome databases and poor integration to third-party tools.

Comprehensive automation technologies command high prices (e.g., Opsware proposals in excess of $1M are common). Because potential benefits are significant, such investments may actually represent good overall value (e.g., if a $1M investment yields a $2M operational expense reduction). Headcount reduction is an easily tangible ROI factor, but speed, agility, and accuracy must also be taken into account. Human error, alone, can be reduced by up to 80% or more. Regardless of skill level, all humans are inherently inefficient and error-prone. Automation offers a means to manage these risks and drive ROI.

Continuing IT infrastructure sophistication will render manual tasks even less practical than current practices. Dynamic adaptation of grid computing systems and resilient networks requires tight control over configuration parameters, driven by rich performance and status monitoring. Such infrastructures are impossible if they are dependent on manual configuration adaptation. Indeed, the basis for all initiatives is automated management.

Outsourcing is often employed to complement automation. Both are results of skill commoditization. Both are viable options for streamlining IT operations, and both require careful thought and planning to be successful. Increased automation enables more flexibility for targeted outsourcing (e.g., management service providers, hosting services, security) and enforces stricter adherence to service provider interface definitions. As both automation and outsourced services evolve, more granular and more dynamic outsourcing will be possible (e.g., Tier 1 of the command center outsourced, with higher tiers maintained in-house). In fact, outsourcing vendors are leading the automation curve to achieve economies of scale and offer higher value to their customers. EDS is a good case study of this point. A stipulation of EDS's acquisition of Loudcloud's hosting business was that EDS would use Loudcloud's automation technology (now Opsware) for these services.

Bottom Line

Enterprises should embark on broader IT operational automation efforts, because technology solutions are now maturing to enhance efficiency and value to the business.

Business Impact: IT operational automation accelerates value delivery from technology services and reduces IT expenses.

Figure 1 — Operational Automation Evolution
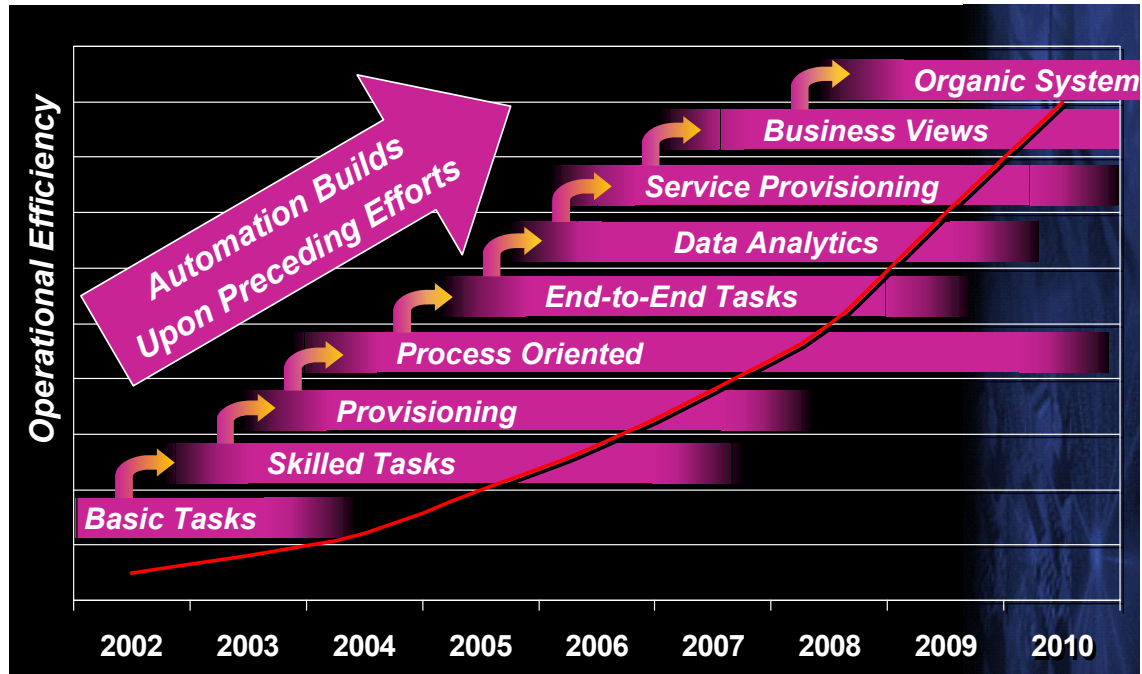
Automation efforts will develop cumulatively over the next decade:

- Basic tasks are now maturing. These tasks include job scheduling, backup/restore, simple monitoring, and restarting systems and jobs. This has been the major thrust of infrastructure and application management (IAM) efforts since the early 1990s.
- Skilled tasks include server and network configuration, limited database administration, change coordination, and contract tracking. This is the next major step in operational automation.
- Provisioning systems are now in their early stages to simplify provisioning of new infrastructure (e.g., servers, network services). Such tools will accelerate adoption in 2005/06.
- Process-oriented automation will begin with unified incident management, followed by broader configuration management and capacity management. Growth in process automation will span several years because ITOs must first adopt strong processes before they can be automated. Process adoption is accelerating but heavy inertia of existing practices will impede overall progress.
- End-to-end tasks will merge infrastructure configuration and capacity management across technology silos, enabling end-to-end visibility and laying the groundwork for more complete service provisioning.
- Data analytics will analyze performance and availability information in real time, first for accurate service-level reporting and followed by policy-based actions to compensate and adapt to changing conditions. While limited data analytics are now used for some infrastructure component visibility, true data analytics at the service level will occur in the latter half of this decade.
- Service provisioning will automate the establishment and maintenance of higher-level applications and services based on service-level measurements and business requirements.
- Automation of business views for IAM systems will finally emerge by 2006/07 and mature slowly because business views are complex and some components will still lack sufficient instrumentation for automated business process relationship discovery.
- Organic systems will emerge late in the decade with the true realization of self-healing, self-configuring, and self-organized business infrastructure by 2010-12.

Source: META Group

Figure 2 — Operational Automation Evolution

Automation is a concept that has long invoked fear into threatened workers and inspired passionate debate between these workers and those who drive automation into the affected employment domain. As business requirements and fiscal pressures force IT organizations toward higher degrees of automation, these same emotions and debates are now impacting IT operations. IT professionals enjoyed an increasingly superior status through the 1990s, but economic realities now require business leaders and senior IT executives to re-evaluate the use of skilled IT staff.

Nobody can debate the need to "do more with less" in any facet of IT operations. This is a basic truth in any business venture, and the IT organization is not exempt. Any attempt to streamline staffing first targets commodity functions. Functions that have already commoditized include:

- Backup and restore
- Status monitoring
- Software distribution
- Performance monitoring
- Job scheduling
- Reporting
- Restart of inoperable servers or jobs
- Alert notification

It is now commonplace for these functions to be performed by management tools, with little, if any, human intervention. The next phase of IT operational automation will include functions previously performed by staff with advanced technical skills:

- Server configuration
- Tier 1 technical support
- Network configuration
- Help desk/self-help
- Performance assessment
- Root-cause analysis
- Contract tracking
- Inventory management
- Change coordination
- Database reorganization

Wholesale replacement of these professionals will not happen for several years, but a rearrangement is already gaining momentum. By automating the more mundane administrative tasks, skilled administrators can significantly increase their productivity. Higher productivity, however, will produce a surplus of qualified administrators, so staff reductions are unavoidable. The few remaining administrative staff will assume more strategic roles in architecture, design, and advanced technical support tiers. Everyday operations will either be fully automated or performed by low-skilled, low-cost workers with the aid of automation systems.

As process-oriented automation matures by mid-decade, infrastructure will exhibit dynamic behaviors (e.g., grid computing, Web services), minimizing the need for skilled involvement in broader configuration and maintenance operations:

- Capacity management (adaptation)
- Root-cause avoidance
- Change management
- Infrastructure provisioning
- Asset management
- End-to-end service provisioning

Strategic functions will avoid automation indefinitely. The tight relationship necessary between the IT organization and business users requires social and reasoning skills that are not easily reproduced by technology. Human heuristics and intellect are necessary to design and architect IT solutions to serve business requirements and emerging technologies will continue to challenge existing operational approaches. IT positions that will remain secure for the foreseeable future include:

- Business relationship management
- Infrastructure design and architecture
- A select group of subject-matter experts
- Systems analysts
- Capacity management (planning)
- Security experts
- Automation technology experts
- Outsourcing strategists

Source: META Group