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IT Operations 2009: An Automation Odyssey

by Glenn O'Donnell
for Infrastructure & Operations Professionals

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IT Operations 2009: An Automation Odyssey

Prepare For The IT Automation Inflection Now

by Glenn O'Donnell
with Simon Yates, Ben Echols, Christian Kane, and Lauren Nelson

EXECUTIVE SUMMARY

A combination of forces, including skyrocketing complexity and severe economic pressure, are radically and irreversibly altering the IT landscape. New methods, new functional sourcing, and new organizational structures are needed to address this onslaught, but one theme is obvious throughout all of these approaches — a need to automate more of what you do in IT. The typical IT organization wastes a significant portion of its budget on inefficiencies that only get worse as complexity grows. Automate many of these tasks and you become leaner and more responsive to business changes. Evidence indicates an automation "tipping point" is already under way this year. All IT shops need to consider their plans for automation, including the many derivative outcomes for process refinement, staffing, tools, and the organization itself.

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NOTES & RESOURCES

Forrester interviewed 33 vendor and user companies, including Avocent, BMC Software, CA, Cfengine, EMC, HP, IBM, KACE Networks, Microsoft, NetBrain Technologies, NetIQ, Network Automation, Novell, Opalis, Phurnace Software, Symantec, and VMware.

Related Research Documents

"IT Process Automation: Q4 2008 Market Update"
February 5, 2009

"The Forrester Wave™: Data Center Automation, Q2 2008"
April 15, 2008

"Data Center Automation Defined"
February 26, 2008

INEFFICIENCY PLAGUES IT OPERATIONS

IT has a long and deserved reputation as an entity of the business riddled with inefficiencies. Generally, inconsistent practices and processes result in far too much duplication of effort, mistakes, rework, and service instability. With approximately 75% of the IT budget spent on simply maintaining existing IT operations, improvements in automation can represent big savings.[1] The primary culprits of operational inefficiency that can be addressed by automation are:

- **Execution takes too long.** This is an obvious situation. People just take longer to do something than a computer can do it. As demand intervals shrink, manual execution times are increasingly intolerable. A good example is patch management. Patching software was once performed by making personal visits to each system, including client systems, and installing the new patch. This method became known as "sneakernet" because of all the running around. It was quickly determined to be unsustainable, so automated patch management software was developed to distribute and install patches over the network and thus eliminate the need for the visits. Today, it is unthinkable to use sneakernet for patch distribution.

- **Tasks are error-prone with inconsistent results.** Simply put, humans make mistakes, and this truism applies to every single one of us. Software, hopefully, does not. Patch management had proven in the past that mistakes cost us dearly. If we botched any step, we had to send a person back to do it all over again. Even if an individual failure probability is low, multiply by the number of systems to patch and the probability of at least one failure is virtually 100%. Automated solutions ensured a nearly perfect degree of accuracy and redo costs plummeted to near zero.

- **More bodies do not necessarily scale workloads.** If you need to build a house, 10 carpenters would very likely complete construction far faster than a single carpenter would. Some tasks, including many in IT operations, do not benefit from scaling up the workforce. A good example of this dilemma is incident analysis of complex systems. With the dizzying variety of factors involved in modern IT services, even the brightest minds are no longer able to comprehend this labyrinth to decipher the root cause to remediate the situation. Automated analysis tools based on sophisticated mathematical algorithms and object models of the services are proving far more effective and efficient than even an army of brilliant engineers. For many IT services, complexity has surpassed human ability. The only answer is technology to manage the technology.

None of these points should be interpreted as an indictment of human stupidity. People — and especially technologists — are highly intelligent. It is prudent, however, to recognize the limitations of even the most superior of human abilities in an age of such incredible complexity. Automation is inevitable to address the challenges ahead. Truly intelligent people acknowledge this and are driving unprecedented service speed, quality, and flexibility via automation.

Pursue Automation To Improve Efficiency And Achieve Simplicity

The need to overcome inefficiency issues has sparked a strong interest in initiatives such as ITIL, COBIT, and Six Sigma.[2] The intended goal of these frameworks is to improve the discipline within IT. For infrastructure and operations professionals, the growth is manifest most notably around ITIL.[3]

- **ITIL paves the way to common process.** ITIL process structure is a wonderful improvement over past practices because it helps defines the discipline that you need to institute within the organization. By following common processes, many of the headaches that plagued IT in the past can be remedied.

- **ITIL v3 introduces the concept of service life cycles.** ITIL v3 is a better framework for discipline than its predecessor definitions.[4] ITIL v3 covers a full life-cycle approach for services, from inception to end of life. The scenario ITIL v3 proposes is remarkably — and intentionally — similar to strong system engineering, a serious weakness in most IT organizations.

Seek Automation As The Right Mix Of Process And Technology

You need more than just process, however. You also need technology to accelerate the execution of the processes and enforce consistency to this execution. Done manually, process execution is slow and remains vulnerable to erratic results. Automation is the answer. Automation is the proper combination of process and the technology used in its execution — not just the technology component. Many of IT's woes can be traced back to the deployment of management software (automation tools). These deployments:

- **Were performed in a vacuum.** Tools were often purchased as a means of exoneration or to solve a specific pain point. They were rarely planned as integrated components of broader initiatives. Because IT organizations have traditionally been fragmented, the tools became isolated pockets.

- **Focused on a specific technology silo.** Almost all tools were purchased by a single technology domain (e.g., network, storage, Unix server) to address the needs of only that silo. As a result, tools were unable to function outside of that silo. This is not necessarily bad if the tools could be integrated broadly at some level.

- **Were hard to consolidate later.** Despite efforts to consolidate these tools into a unified portfolio, artifacts of this myopic focus continue to impede IT efficiency.[5] With tools built by different vendors for different needs, standard interfaces and process flows were not considerations. The new popularity of integrated processes now mandates consolidation, but integration remains problematic. Legacy tools must either be replaced or retrofitted for an integrated portfolio, and neither option is easy or painless.

Process must be paramount in any automation discussion. Tools merely accelerate process execution. If the process is bad, you just do bad things faster and, logically, if processes are good, you do good things faster. This forms a snowball effect that accentuates process merits and drawbacks. Accelerating bad processes can accelerate the organization's decline toward irrelevance. Accelerating good processes accelerates the organization's climb toward excellence and recognized business value.

IT IS JUST THE LATEST PHASE OF BUSINESS AUTOMATION

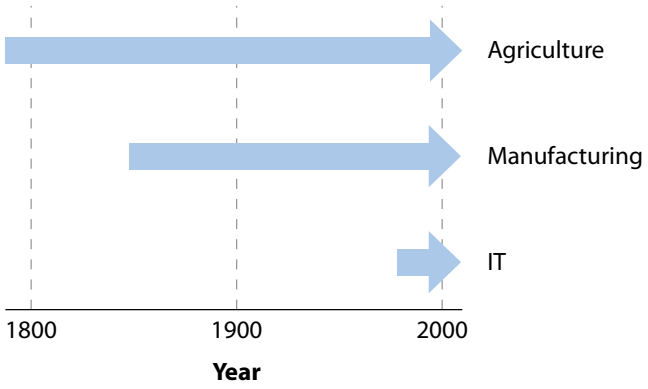
The need for IT automation should come as no surprise. Other major production movements in history have undergone their own revolutions as a direct result of automation. Examine how automation has changed agricultural and industrial production, irreversibly changing global society (see Figure 1).

- **Agriculture.** Farming is a good case study to single out because it has a longer history than industrial production, certainly longer than IT. The benefit to society is profound. Higher farming productivity means more people are adequately fed. Global population growth makes this need particularly acute, so the agricultural industry must keep innovating to address exploding needs. Eli Whitney's cotton gin is regarded as one of the pivotal innovations that sparked a revolution in farm productivity in 1794.[6] Farming's major inflection point in productivity did not occur, however, until the 20th century, when tractors finally appeared on the scene. Specifically, wartime technology development during World War II and an increased need for food resulting from the war launched a revolution in farm productivity.[7] World War II was a pivotal event for farming and indeed for industrial production. It even spawned a new field that we now call IT.

- **Manufacturing.** From Fulton's steam engine, to Henry Ford's assembly line, to robotics, mass production of anything is now automated. Cheap labor is not the secret to manufacturing success; automation is the key. Making more units per person-hour and doing so with precision is a golden rule in manufacturing almost all products.

- **IT.** From the late 1940s through the mid 1990s, IT grew rapidly, but did not apply much automation to address the expanding complexity. The advent of distributed computing in the 1980s demonstrated a need for more automation. Management software has been used for mainframe operations since the 1970s, but distributed networking proved to be a complexity accelerant that mandated new management software. This is recognized as the birth of the modern management software industry, now a $20-billion industry.[8] The dawn of IT automation came about in the early 1990s.

Figure 1 IT Is Following Automation Evolutions Witnessed Before



54531 Source: Forrester Research, Inc.

What Is Automation?

Automation in the IT domain is many things. In general, however, it has been considered to be the management software tools used to execute normal operational processes. Every management tool is an automation product because it applies to one basic dictionary definition:

> ***Automation (noun):*** *automatically controlled operation of an apparatus, process, or system by mechanical or electronic devices that take the place of human labor.*[9]

Software is the "device" that takes the place of human labor. Even the simplest script or monitoring tool is an automation function because it performs a task without human intervention. IT automation will serve one or more of the following purposes:

- **Improve productivity.** You need to streamline the execution of processes to maximize the return on the investment made in hardware, software and labor. All three are pillars of productivity; however, you probably have not realized the full potential of these investments if process execution is too slow.

- **Drive consistency.** Why do service malfunctions occur with painful frequency, even when all of our monitoring tells us everything is healthy? Because of complexity, the many moving parts are difficult to keep under control and repeatable execution suffers. You lose track of configurations that drift. Unauthorized changes occur. Changes that are made are often performed in different ways. You fail to consider the end-to-end service despite optimizing technology pockets. Good system engineering lays the groundwork for consistency, and automation tools enforce the policies and processes behind good system engineering.

- **Keep IT processes within acceptable tolerances.** Manufacturing processes depend heavily on control limits to maintain tight adherence to tolerances, thus ensuring product quality. Automated systems adjust to changing conditions to remain within these limits. IT services also depend on tolerances that determine quality, so a similar model makes sense. Some network automation technologies already exist to maintain quality of service for services like voice over IP. Expanded focus on other automated controls will observe behavioral thresholds and adapt to remain in compliance with quality policies.

Locate Your Threshold For Automation

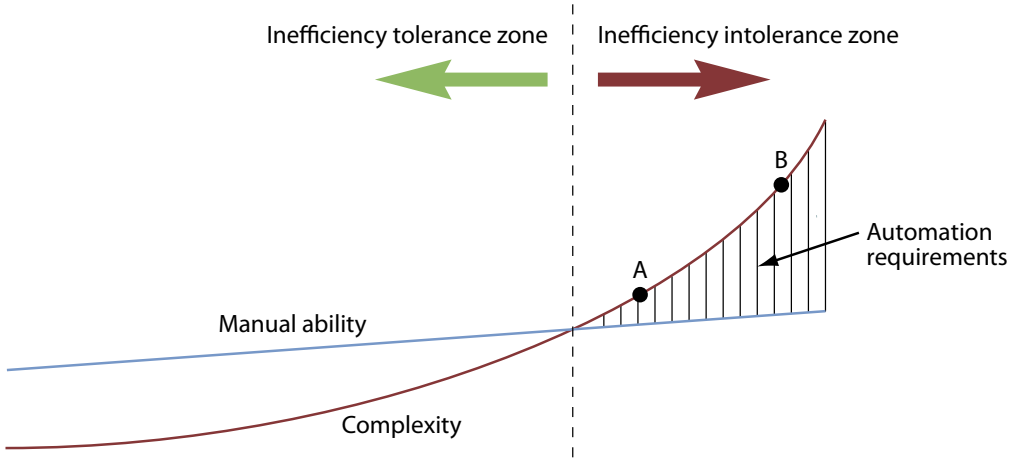
Complexity determines the threshold that drives your automation requirements. The nature of technology complexity is exponential growth, but the limitations of manual execution impede the effective management of this complexity without expanding automated assistance.[10] These limitations greatly handicap your potential productivity. At some point in time, complexity exceeds manual ability and automation becomes a necessity. This crossover proves to be an inefficiency threshold that marks an important transition in your IT operation (see Figure 2).

In the early days of IT, you could manage the environment as long as you had a talented staff. As complexity increased and put a strain on your staff, management tools were implemented to solve the problem. The threshold where complexity surpasses manual ability is a bit arbitrary, but once this point occurs, you begin to struggle with managing the complexity.

Before you hit the threshold, inefficiency can be tolerated because staff can compensate, but once the threshold is reached, complexity changes the game dramatically. The pain of inefficiency is amplified and staff becomes overwhelmed by the sheer magnitude of maintaining stable services. Because of the exponential progression, the pain only gets worse, and rapidly becomes unbearable. If point A presents difficulties, conditions at point B present a near-impossible scenario unless very different approaches are employed to combat the complexity.

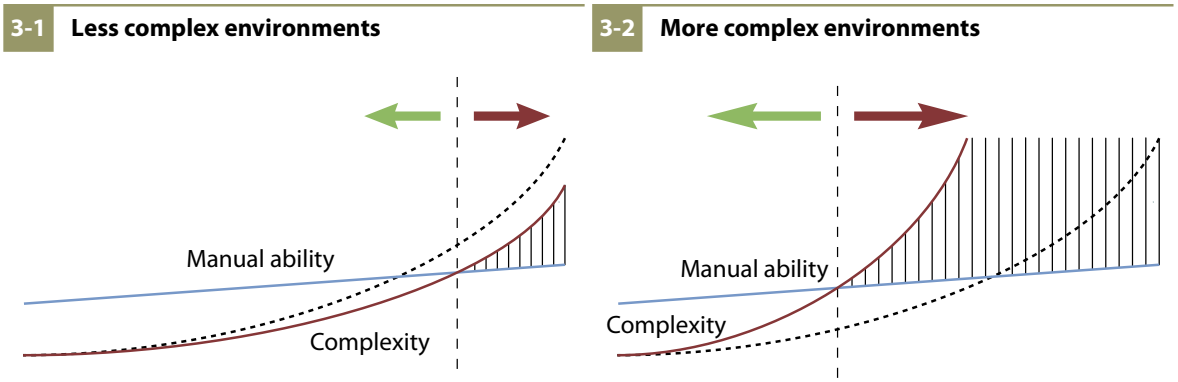
Where this threshold occurs in time varies with the complexity experienced by different organizations — two rather extreme examples of this variation are shown below (see Figure 3). On the left is a company with relatively low complexity and therefore lower automation requirements. The dotted line represents the original complexity trajectory. On the right is a highly complex company with correspondingly higher automation requirements. Note that the tolerance threshold has moved considerably. Whether your own situation is complex or not, almost all organizations have already passed their threshold and now need some degree of more evolved automation.

Figure 2 Automation Requirements Gap



54531 Source: Forrester Research, Inc.

Figure 3 Automation Requirements Vary By Complexity



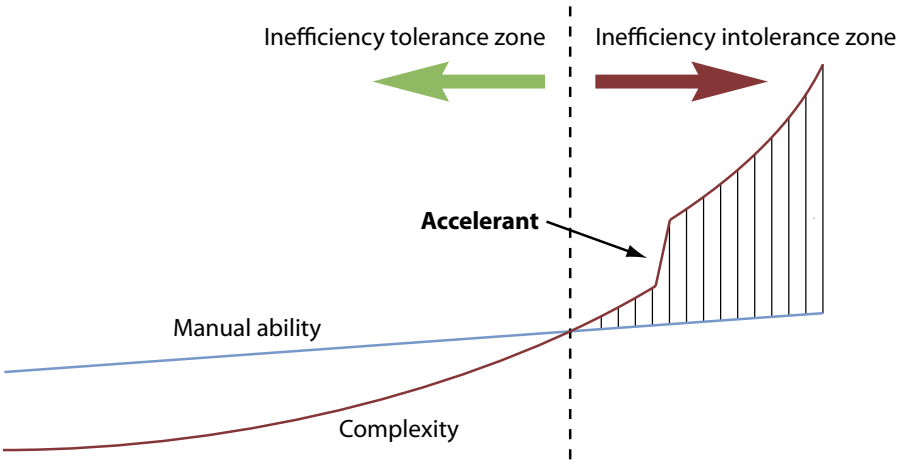
54531 Source: Forrester Research, Inc.

Accelerants Exacerbate The Complexity Progression

The complexity curve shown is smooth, a fairly predictable growth progression. Business conditions and technology introductions are far less predictable. Occasionally, an event — known as an accelerant — occurs that causes a disruption in this smooth progression. An accelerant causes complexity to make a leap, causing a discontinuity in the curve (see Figure 4). More than just a speed bump, this accelerant alters what you do and how you do it. It is a point of no return, because complexity continues on its relentless march after this point. In fact, the growth accelerates even more than it did prior to the event.

Common accelerants of the past include client-server computing in the 1980s, the Internet and the World Wide Web in the 1990s, and the 2001 to 2002 collapse of the dot-com bubble. More recently, the sudden rise of social networking has shattered old customer interaction expectations.

Figure 4 Automation Accelerants



54531 Source: Forrester Research, Inc.

2009 IS A MAJOR IT AUTOMATION INFLECTION

Dramatic new accelerants are now kicking in. There are at least two of note and depending on your vertical industry there may be more (e.g., healthcare, financial regulations, or government stimulus packages). The two accelerants that are combining to launch IT in a new direction in 2009 are virtualization and the economy (see Figure 5).

The one-two punch of virtualization and economic pressure represents a tectonic shift for IT in many ways such as:

- **Processes *must change* and they must be strictly consistent.** The rapid adoption of ITIL, COBIT, Six Sigma, Lean IT, and other process improvement initiatives is indicative that there is strong recognition that a new way of doing IT is needed. These frameworks are not entirely new, but the attention being paid to them is increasing rapidly.

- **Management tool portfolios *must change* to accelerate and enforce process execution.** Tools are not synonymous with automation. Tools can allow you to execute faster and can also enforce process execution. Tools remain a glaring gap in automation efforts because most incumbent tools are built on outdated code and modeling structures and are therefore unable to integrate across domains. Tools that can solve these problems are either still in their infancy or do not fit

well with incumbent tools. Historically, management tools monitored a lot, but managed little. New needs (e.g., workflow automation, complex policy enforcement) need tools that *manage*.

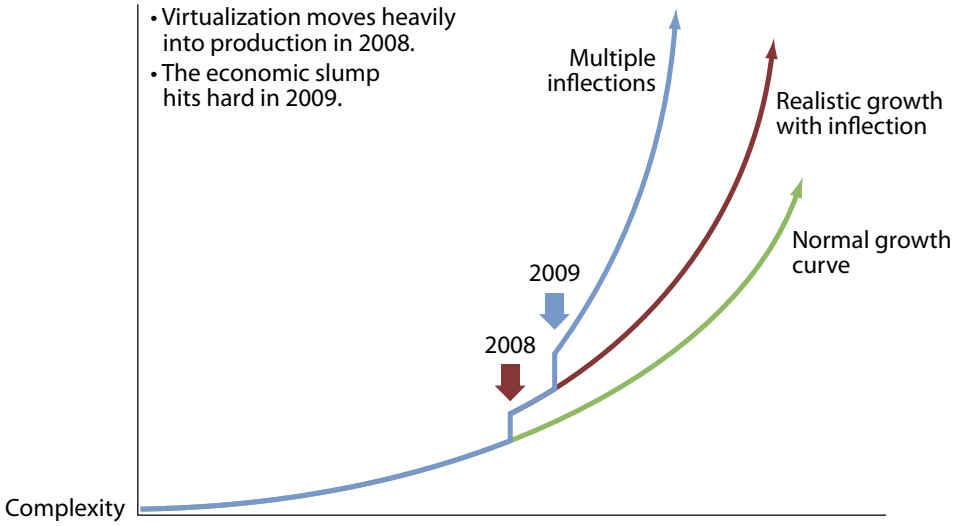
- **Skills *must change* to adapt to shifting requirements.** Automation means some jobs become marginalized, but other jobs are emerging. Continued dependence on deep technology skills for ongoing operations impedes efforts toward efficiency improvements. Many skilled tasks can now be either fully automated or executed by less-skilled and lower-paid workers with the assistance of automation tools. The skills shift is moving from technology domains to automation tools and processes.

- **The organizational structure *must change* to revolve around new service models**. Employees with deep technology domain expertise are migrating from operations and toward engineering and architecture roles. This organizational change is consistent with other mature product and service organizations. The technology brain trust should be focused on design functions where their talents offer the most value and where they can contribute to genuine innovation. Their role in operations cannot be to address the majority of incident resolutions. Problem management, on the other hand, involves a higher level of resolution, and this is an appropriate role for subject matter experts.[11] The operations organization needs to become more "industrialized." To accomplish this goal while still delivering quality services, automation must be properly applied and roles must be clearly defined. Critical elements of these clear definitions are the interactions with other roles. The end result is a slimmed-down organization that is also highly effective and responsive to change.

- **Incentives *must change* to encourage adaptive behaviors.** The most fundamental of all forces affecting progress will be the incentives used to encourage desired behaviors. In the past, incentives revolved around the techno-heroics performed by the intellectual stars. Instead of rewarding firefighting, which also rewards arson, reward behaviors that focus on quality — preventing fires instead of fighting them. Tie incentives — including bonus payments — to quality metric targets (e.g, 5% lower response time, 10% higher change success rate). Incentive pay will be more than offset by improved service quality. Good intellectual stars will benefit from the altered incentives.

The common denominator in all of these is change. IT is in the business of changing business, and we must change ourselves. Change is unavoidable. Our world is in constant flux, and those who revel in change will thrive in the new world of IT.

Figure 5 Accelerants Combine In 2009



54531 Source: Forrester Research, Inc.

Attack The Accelerant Forces Of 2009

Virtualization is more than just VMware. In fact, it is more than just server-focused. That said, server virtualization has indeed proven how you can gain benefits from virtualizing infrastructure. It works well, and the explosive growth of virtualization is testament to its virtues.[12]

Although virtualization adds a new layer of structural complexity, its truly disruptive aspect is mobility. It is now so easy to move virtual instances around that you create untenable situations where complexity can run amok. Suddenly, servers are not static entities but are somewhat mysterious apparitions that can be in one place today and somewhere else tomorrow, with no perceptible impact to the end user. It is a remarkable innovation but one fraught with all sorts of traps for IT operations.

Add to this virtual chaos the worst economic slump since the 1930s. The "do more with less" cliché is no longer a nice mantra. It is an absolute imperative. Senior executives are demanding more discipline from IT, more efficiency, more consistency, more reliability, and more flexibility; all with lower budgets and fewer staff. None of these characterize the typical IT organization. Improvements have certainly been made since the irrational exuberance of the 1990s, but this whole notion of discipline needs its own tectonic shift. Executives will make changes whether you like them or not, so you must work to ensure that you are a change driver, not a change victim.

Balance Automation Pain Versus Automation Gain

Automation is certainly beneficial, but don't overlook the costs involved. The costs are varied, but can pose a risk to automation ROI if not properly balanced against the benefits. The major costs include:

- **Tools.** These are sometimes viewed as the primary cost associated with automation. Many automation solutions are expensive, especially when you consider the installation, configuration, and ongoing maintenance costs. This "blood, sweat, and tears" investment is usually an overlooked cost element and the one most likely to impede or scuttle automation efforts.

- **People.** Although some of the most significant benefits are labor savings, specific skills are needed to make the transition to automation. These skills will mostly revolve around tool expertise, but also process expertise such as ITIL experience. The needed talent comes at a high price, since demand is high. Existing personnel can be trained, which also carries a price, and salaries will need to be adjusted to match market norms.

- **Process improvement.** Process refinement at the heart of automation must be pervasive in the organization. Training will be needed for all personnel, and certifications are highly recommended for the core team. Also, changes to the organization are almost certain, so consider the costs of the reorganization.

It is almost certain that you will realize substantial overall benefits in operational expenses and business agility if you approach automation right. This includes controlling the costs outlined above. Automation is not a panacea. Approaching it with limited insight and planning can be devastating, since you will likely exacerbate systemic process and technology deficiencies. Conversely, process excellence coupled with the right technologies, personnel adjustments, and cost balance will undoubtedly produce highly effective and highly efficient service delivery.

WHAT IT MEANS

BE THE AUTOMATOR NOT THE AUTOMATED

One of the uncomfortable facts about automation is that some jobs will be eliminated. If you are in a position vulnerable to automation, we strongly recommend that you shift your career to the positions contributing to your prior position's elimination. This may seem like betrayal, but the trend is inevitable with or without you. It is far better to drive the change than resist it. Besides, who better to automate a function than someone intimately familiar with it? Your background will prove valuable to the business that is seeking to automate your work. If you resist, you will likely be witnessing this transition from the outside.

ENDNOTES

[1] See the October 18, 2005, "Defining The MOOSE In The IT Room" report. [37961] Despite its age, it is a seminal document that outlines the operational costs of IT. The acronym stands for maintenance and ongoing operations, systems, and equipment.

[2] The IT operations team is shifting from a technology-led, siloed structure into a process-centric, service-oriented organization. Making the transition won't be easy, and IT folks are bombarded with a multitude of IT management frameworks — all sounding the same — designed to reorient the operations team around new goals, new skills, and new expectations. This research document describes the multitude of frameworks available and suggests which ones are important for your organization. See the May 7, 2009, "Unraveling ISO, CMM, And ITIL IT Management Frameworks" report.

[3] Several Forrester reports cover various aspects of ITIL growth. See the October 8, 2008, "Inquiry Spotlight: ITIL, Q4 2008" report [47029] for one of the best.

[4] The first version of ITIL was created during the time period 1986 to 1992 and consisted of a variety of booklets based on work done by the UK Government Information Infrastructure Management Forum. The second version emerged during the years 1996 to 1998 with nine books — the two most widely read focused on service delivery and service support. These two books present the foundation for IT service management (ITSM), which is a set of 10 management processes that provide guidance and best practices on managing assets, bugs, changes, disasters, efficiency, and finances. The model shows the goals, general activities, inputs, and outputs of the various processes and facilitates communication and cooperation among various functions in IT. The newest version, ITIL v3, is fundamentally different from previous versions. ITIL v3 focuses on the entire service life cycle, taking the ultimate consumer of the services — the business — into consideration. See the October 1, 2007, "ITIL v3: The Evolution From Process To Service Model" report.

[5] Much of the multibillion-dollar investment in management tools is wasted because the tools have been poorly implemented and — more importantly — poorly aligned into a disciplined operations picture. Few doubt that such tools are necessary in our hyper-complex world. They are integral to efficient operation of the business technology environment. More intelligent management of the portfolio of tools is imperative to extract the full potential from the management tool investment. See the September 5, 2008, "Managing The IT Management Software Portfolio" report.

[6] Source: Eli Whitney Museum and Workshop: The Cotton Gin (http://www.eliwhitney.org/museum/eli-whitney/cotton-gin)

[7] A number of studies on farm productivity were summarized in a good Web article by Wessel's Living History Farm in York, Neb. Source: The Productivity Revolution (http://www.livinghistoryfarm.org/farminginthe40s/money_01.html)

[8] Our basic hypothesis is that 2009 will be a mixed year, with cautious clients during the first six months and a recovery during the second part of the year. IT asset management, change and configuration management, SLM/BSM, end user experience management, and application management will enjoy double-digit growth,

as these segments are seen as having a direct impact on cost improvements and are the major hunting grounds of the IT management megavendors and challengers. See the March 13, 2009, "Market Overview: The IT Management Software Market In 2009" report.

[9] Source: Merriam-Webster Online Dictionary (http://www.merriam-webster.com/dictionary/automation).

[10] Exponential complexity growth is most famously described by Moore's Law, a prediction made by Intel cofounder Gordon Moore in 1965 about semiconductor density. It has proven remarkably accurate since then and has come to characterize the general trends in technology equally well. Source: Intel.com (http://www.intel.com/technology/mooreslaw).

[11] A command center is a group within IT that is responsible for a broad — but not necessarily deep — triage of incidents and execution of service requests. This is different from the common help desk that directly interfaces to the customer base and merely forwards most incidents to a subject matter expert (SME). See the April 30, 2009, "Knocking The NOC: Enter The New Operations Center" report.

[12] See the November 8, 2007, "The Virtualization Imperative" report, in which Galen Schreck made the case for why virtualization is a notable technology development and accurately predicted how it would change IT. Also see the March 16, 2009, "Server Trends: The Hypervisor Wars Heat Up" report, in which James Staten reports data on virtualization's growth.

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