Workload Automation in an Era of Cloud, Analytics, Enterprise Mobility, DevOps and Big Data

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Executive Summary

Almost one third of organizations (30%) and over half of companies with the most mature Workload Automation (WLA) software deployments (56%) currently consider abandoning their WLA vendor and migrating to a “superior” software solution. To make matters even more interesting, only 19% believe that there is no better WLA software out there than the product(s) they are currently using. In other words, 81% of organizations feel locked in by their WLA software vendor and believe that the cost of breaking out of this “embracement” would be too high to justify migrating to a better tool. These findings fundamentally contradict the common belief that there is no growth potential in the marketplace for WLA software.

The Demand for Simplification of Workload Automation

It is not farfetched that the reason for this general dissatisfaction with WLA software is rooted in the inability of many WLA products to sufficiently accommodate the flood of new requirements spawned by an exploding number of business unit driven projects, such as big data, cloud, DevOps and enterprise mobility. Scripts are still widespread (79%) and used as a quick and dirty way of achieving the required flexibility to support these projects, instead of relying on the out-of-the-box capabilities of WLA software.

WLA as Business Process Integration Hub

Most organizations (88%) believe that big data increases WLA complexity and makes SLA management more difficult. This leads to WLA professionals requesting better tools that offer deeper integration with big data, analytics and business intelligence software, as well as central management capabilities providing better insights into the end-to-end big data analytics process. Ultimately, workload automation constitutes the integration hub for big data analytics processes, with tremendous impact on overall project success.

Endless Possibilities Through Cloud

Resource elasticity, dynamic scalability and provisioning speed are the key business reasons for placing WLA workflows into the cloud. Almost half of organizations (43%) are already taking advantage of cloud – private or public – for WLA, despite fundamental challenges resulting from the majority of job workflows still being tied to individual physical hosts. To better be able to benefit from cloud resources, WLA staff is asking for improved job virtualization, better resource pooling and more flexible security management. Security and compliance worries are the most significant concerns for public cloud usage and to a lesser degree apply to private cloud.

Mobile Management is Becoming Critical

Almost half of enterprises are currently able to monitor the health and performance of their WLA software from mobile devices. The availability of a mobile self-service dashboard for business units is at the top of the wish list ahead of mobile troubleshooting and root cause analysis capabilities.

DevOps and Workload Automation

Enabling developers to take advantage of WLA software can have a significant positive impact on their efficiency. Almost half of organizations offer some type of WLA self-service access to their development groups. This means that the WLA group must ensure workload lifecycle management – versioning, promotion, rollback, approval workflows – and detailed auditing capabilities.

In a Nutshell

This ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) research has shown that organizations are looking for a WLA solution that is simple and easily integrates with existing data center systems and public cloud resources. As more and more IT executives recognize the growing impact of WLA software on the overall business, there is an increasing pressure on WLA vendors to innovate and deliver software that lives up to these rising expectations.
Introduction – A Brief History of Job Scheduling

Job scheduling is the oldest discipline in the data center, dating back to the days where the IT department consisted of not much more than a mainframe or two. At that time, enterprise IT was a simple and slow affair, where large processing jobs were run on a regular schedule and in a static manner. Downtime and performance issues did only cause minor inconveniences, but typically had no serious business impact. Business units regarded IT as a nuisance and cost center and showed little interest in leveraging the data center as a competitive advantage.

Next came the days of distributed computing, where growing numbers of individual servers running Linux, UNIX and Windows conquered the data center. Job scheduling had to adjust to this increased complexity by tying together different operating environments and the mostly still existing mainframe. At the same time, enterprise IT was becoming more dynamic and business units began to notice the potential of leveraging IT for creating competitive advantages. Enterprise IT became more than just a cost center. This was the age of adopting multiple job schedulers for different operating systems and enterprise applications. Scripts were used to quickly create job workflows that were difficult to build within the existing job scheduling software or where there were simply not enough licenses available.

Today, IT is generally recognized as a leading enabler of competitive business advantages. Cloud, big data, DevOps and mobile management are all aimed at providing organizations with capabilities and insights to rapidly adjust to customer requirements. In this dynamic and customer driven world, job scheduling is more important than ever, as it constitutes today’s business process integration hub that connects applications and data sources across mainframe, distributed server environments and cloud (see Figure 1).

Modern job scheduling software focuses on getting the right data to the right systems in the right format at the right point in time. In short, job scheduling is the backbone of enterprise IT that integrates and centrally controls a growing number of enterprise applications and data sources. Due to the drastically increased requirements in terms of speed and flexibility and because of the dynamic and event driven nature of job scheduling today, “job scheduling” will be referred to as “workload automation” (WLA) in this research paper.

This Enterprise Management Associates report aims at identifying, defining and quantifying the impact of modern enterprise IT projects – cloud, big data, analytics and DevOps – on WLA. Based on this impact, EMA will derive future requirements and investment priorities for end customers and vendors of WLA software.
Who Was Asked and Why

When conducting end customer research, it is essential to understand that WLA is a tremendously specialized discipline. Therefore, to truly learn about the technical impact of the new wave of business-driven IT projects on WLA, it is vital to only poll staff with actual hands-on experience in this field. As a minimum requirement to be included in this study, respondents had to perform at least three duties that are typically taken on by workload operators, designers, infrastructure administrators, modelers and analysts (see Figure 2).

![Figure 2 - Job functions performed by survey respondents](image-url)
In addition to opinions by subject matter experts, this study includes an “executive viewpoint” represented by CIOs and CTOs (17% of study sample), vice president level IT executives (6% of study sample) and IT directors (15% of study sample; see Figure 3). These IT executives are deeply involved in the strategic aspects of enterprise IT and provide a higher level perspective of the perceived pain points and challenges of WLA. As expected, the study found that IT executives tend to underestimate and sometimes trivialize operational WLA challenges, while at the same time applying significantly more “business vision” to the WLA discipline than “the people who do the work.”

In order to ensure involvement of all respondents with the selection and implementation of WLA technologies, only decision makers (technical and financial), influencers, evaluators and WLA end users were included in the study sample (see Figure 4).

![Figure 3 - The executive perspective](image)

![Figure 4 - Roles regarding WLA software selection and implementation](image)
The overall study sample is comprised of participants from small (51%), medium sized (18%) and large enterprises (31%, see Figure 5). Approximately 38% of these enterprises had adopted a single private cloud platform, while 36% currently used multiple private clouds and 26% did not have a private cloud in place at all. More than 20% of participating organizations had adopted Hadoop as their distributed file system for big data analytics.

![Figure 5 - Survey participants by company size](image)

### The Workload Automation Status Quo

#### General Maturity

The study sample was subdivided into organizations of three maturity levels (low, medium, high). This was necessary to detect trends in terms of WLA pain points, software selection criteria and future requirements. These three maturity levels are based on the following factors.

#### Central Workload Management

Only if there is one central scheduler acting as the business process integration hub (see Figure 1), is it easily possible to monitor and manage entire workflows across multiple operating systems and enterprise applications in a business centric and SLA-compliant manner. This research has revealed that 41% of organizations manage all of their jobs through one single scheduler, while 38% manage at least the majority of their jobs centrally (see Figure 6). The remaining 21% utilize numerous application and operating system schedulers and scripts, without significant focus on central WLA management. Indeed, it is interesting to observe the incredible variety of schedulers that can be found within an individual company. For example, approximately one quarter of BMC Control-M customers is also running CA Workload Automation AE and almost half of them are running IBM’s Tivoli Workload Scheduler.
Workload Centric Infrastructure Management

Only 45% of organizations are able to manage workload-relevant infrastructure – server, network, storage – health and performance through one central dashboard (see Figure 7). Another 46% are currently working on implementing this capability, while 9% have stated that centralized management of the WLA infrastructure is not a future goal. Like the above-discussed centralization of WLA software for consolidated job workflow management, the management of workflows within the context of server, network and storage infrastructure is essential to ensure SLA-compliance. Only when infrastructure considerations are part of the placement process of new workloads, as well as of the management and decommissioning of existing workloads, can workload health and performance be optimally ensured.
**Self-Service Health and Performance Monitoring**

More than half of organizations (58%) empower business units to monitor health and performance of their own workloads (see Figure 8). This capability is significantly more prevalent in large organizations (69%), compared to midsized (61%) or small ones (49%). Within the next 12–24 months, 81% of organizations will provide health and performance dashboards for business units. The fact that IT departments are recognizing the importance of making WLA transparent to business stakeholders is an indicator of the increasing awareness of the importance of WLA for the overall business.

Remarkably, 100% of organizations with the most mature WLA deployments offer these self-service health and performance monitoring capabilities, whereas only 6% of the least mature WLA groups do. This finding illustrates that self-service monitoring of workloads for business units is an important milestone on the way to increased WLA maturity.

**The Use of Scripts**

The fact that 79% of organizations still use scheduling scripts illustrates that WLA maturity is not keeping up with other IT disciplines. “Cost” (58%) and “modularity” (57%) were the main reasons for organizations to resort to the use of scripts (see Figure 9), instead of relying on the built-in capabilities of their scheduling software. Scheduling scripts come with a host of disadvantages – error prone, difficult to support, lack of change management, difficult SLA management, hard to reuse – that could be eliminated if WLA software vendors conclusively addressed cost and modularity concerns.
### Hypervisor Integration

WLA software today shows significant integration with virtualization platforms, such as VMware vSphere and Microsoft Hyper-V. This enables organizations to dynamically “move workloads based on resource utilization” (40%), “plan capacity” (39%), “migrate virtual machines” (38%), “move workloads based on performance requirements” (37%) and even “power on and off virtual machines as needed” (35%, see Figure 10). Only 25% of large companies and 17% of smaller enterprises indicated that the integration of WLA software with hypervisor platforms was not required. However, this relatively high degree of hypervisor integration should not distract from the fact that more than half of organizations currently do not have their WLA software connected to their hypervisor at all. Without this integration, it is difficult to dynamically provision, scale, balance and manage workloads throughout their lifecycle.

![Figure 10 - Integration capabilities of WLA software with hypervisor platforms](image)

### Self Service Portal

More than half of organizations (54%) offer a self-service portal with at least basic workload automation services to their business units. To enable self-service in WLA, integration with IT Process Automation (ITPA) software is a requirement. ITPA software takes on essential WLA management-related tasks such as “automated configuration” (44%), “resource provisioning” (43%) and “lifecycle management” (40%). Organizations stated “lack of expertise” (49%) and “lack of communication between WLA and ITPA owners” (45%) as the key reason for insufficient integration between WLA and ITPA (see Figure 11). The fact that 39% of organizations do not see sufficient demand to invest into more integration between these two disciplines constitutes a significant challenge that slows down progress in WLA, as without more ITPA integration, WLA remains a siloed cost center.

![Figure 11 - Key reasons for the lack of integration between ITPA and WLA](image)
When looking at organizations that have developed a generally more mature WLA group, it was determined that these companies place a much higher emphasis on the importance of ITPA integration. Figure 12 shows that this observation reaches across all ITPA categories.
Provisioning Speed of New Job Workflows

It typically takes 3–7 days from the request for a new job workflow to the provisioning. However, 23% of organizations are able to provision new workflows within 1–2 days and 9% can set up new jobs within one day (see Figure 13). On the other side of the spectrum, 9% require more than three weeks to provision new job workflows. We can generally observe a trend toward longer provisioning times with growing company size. In today’s age of self-service deployment of applications, it will be vital for WLA to dramatically accelerate provisioning times.

![Figure 13 - Provisioning times of job workflows](image)

Conclusion

This random study sample showed the expected distribution of the majority of organizations falling into the “medium maturity” category (49%), while 19% belonged to the “low” category and 32% showed a “high” level of maturity. Throughout this entire study, EMA found a tremendous number of highly significant correlations between organizations belonging to one of these three maturity groups and the way they answered a specific question. These correlations are essential for predicting how WLA related pain points and requirements evolve as WLA teams become more sophisticated.
Customer Satisfaction

Interestingly, large organizations show the lowest satisfaction ratings across the board. For example, while 17% of small enterprises and 25% of midsize organizations are “very satisfied” with the “time to market of complex workload dependent business services,” this is only the case for 11% of large organizations. We can find similar differences for “SLA compliance” and “performance and health monitoring” (see Figure 14).

The following charts (Figure 15) show how CIOs and CTOs are significantly more satisfied with WLA software than job schedulers, designers and operations staff. This may be due to a general lack of understanding of the intricacies of WLA and the business impact of this discipline. It is still a common approach to regard WLA as a cost center, instead of an enabler of business critical services. If used to its full potential, WLA software can become a business-process integration hub, with critical impact on SLAs across the data center.
Stonebranch Opewise Case Study

A major international travel website (we will call it “ITW” for the purpose of this case study) has been using Stonebranch Opewise Automation Center (Opewise) since 2010. Opewise currently manages development, staging, and production systems consisting of more than 270 virtual servers, using four management servers (one for development, one for testing and two for a high-availability setup of the production environment). Load balancing is achieved through Opewise’s ability to assign job workflows to a server cluster, so that jobs are processed on the least busy servers.

When asked for the key reasons for adopting Opewise, the customer provided EMA with two core arguments that tipped the scale toward Opewise. Both of these arguments go in line with the evaluation criteria unveiled in this EMA research report (see the paragraph on “Pain Points and Reasons to Migrate to another WLA Platform.”

1) Adoption: Developers tend to make up their own solutions as they go, when it comes to WLA. These solutions typically consist of scripts – CRON in ITW’s case – and free niche schedulers, such as Oozie, Spring or Azkaban for Hadoop. ITW was looking for a scheduler that was so easy to use for their massive development team that nobody would try to circumvent it. In addition, ITW required lifecycle management capabilities, enabling developers to directly publish job workloads to the development and test environment, while requiring management approval before deploying or editing production jobs. Going one step further, ITW takes advantage of the Opscode Chef and the CloudStack IaaS platform to rapidly create new compute resources that are automatically joined to the Opewise server.

2) Integration: EMA learned that even when there are no out-of-the-box connectors available, ITW was able to quickly integrate Opewise with Hadoop, Informatica and other enterprise applications via Web services API. Opewise workflows and the virtualized servers they are running on are monitored via ITW’s standard monitoring software (Zenoss). New workflows are requested via API or through ITW’s ServiceNow self-service portal.

EMA confirmed that Opewise has lived up to expectations and that even when external software is not supported directly out of the box, the Opewise APIs make it simple and quick to hook up Opewise to most of the ITW software systems. As a key success metric, ITW mentioned the fact that the adoption rate is trending toward 100%, with none of the developers resorting to CRON jobs anymore. This is specifically impressive, as this research has shown that 79% of organizations still rely on manual scripting.

Summary: As an online business, the quicker ITW can push out new content and features to its audience, the more successful the company will be. EMA was impressed with how well Opewise fit into ITW’s agile development environment, basically treating job workflows similar to code. All in all, ITW testified to Opewise’s ability to convincingly address the key WLA pain points as they were identified in this study – cost, training requirements, difficult upgrades, SLA management, scalability, root cause analysis, lifecycle management, performance monitoring capabilities – achieving a tremendously positive business impact.

HIGHLIGHTS

Customer: International Travel Website
Objectives:
1. Rapidly provision job workflows
2. Integrate with existing enterprise systems (including Hadoop)
3. Easy access for development teams
Solution:
1. Stonebranch Opewise Automation Center
2. Stonebranch Universal Agents
Results:
1. Near 100% adoption among development teams
2. Next day delivery of job workflows
3. Elimination of CRON scripts
Pain Points and Reasons to Migrate to Another WLA Platform

The most significant surprise of this study is the fact that almost one third of organizations (30%) are currently considering the migration to another WLA software product. When looking at the most mature WLA groups, EMA finds that 56% of these organizations are ready to move to a new WLA tool (see Figure 16). Due to the challenges that come with migrating from one WLA tool to another, these numbers suggest that there are significant unaddressed pain points in WLA.

Key Pain Points in WLA

“Cost” is the by far largest pain point in WLA, named by 42% of organizations (see Figure 17) and even 49% of small enterprises. “Too many scripts” is the second most significant challenge for mid-size enterprises (33%), while small and large organizations do not suffer from this issue as much. Conducting “software upgrades” constitutes the second-largest challenge for large enterprises (31%). “High training requirements” is the third-largest issue for midsized (31%) and the second-largest for small (29%) enterprises. “SLA management” represents a significant pain point for large enterprises (28%), but is much less important to midsized (22%) and small (13%) companies.
Figure 17 - Key WLA pain points
“More efficient change management” (47%) is number one on a long list of reasons for organizations to actually migrate to a different WLA software (see Figure 18). “Better auditing capabilities” (40%), “better high availability capabilities” (37%) and “simpler root cause analysis” (35%) come next. All of these reasons are triggered through the complexity introduced by business unit driven projects, such as big data, cloud and DevOps.

Figure 18 - Key reasons for migrating to another WLA platform
One more significant observation is the fact that “simplicity” and “ease of use” are behind many of the reasons that are high up on the list of key triggers for migrating to a different WLA software, such as “simpler root cause analysis,” “easier workflow design,” “easier management of server upgrades,” “easier agent management,” “simpler queue management” and even the “ability to proactively place workloads in the cloud.” The fact that 53% of large enterprises regard “more efficient lifecycle management” as the most important reason for moving to another WLA solution goes in line with these organizations fighting hardest against the complexity pressure introduced by IT projects initiated by business units and their development organizations.

From the overall 70% of organizations that are not looking to move to another WLA solution, only 19% believe that “there are no better tools out there” (see Figure 19). The main reason for not considering a migration is “investments in existing WLA software” (51%). These investments are often aimed at working with the WLA software vendor to create custom features and integration points with the corporate IT environment. Abandoning these investments and starting from scratch often constitutes a significant upfront project and also involves the “admission of responsibility” by IT executives for having purchased a suboptimal solution in the first place. This is even more the case for large enterprises (62%) than it is for smaller ones (48%), as the former often own more complex IT environments with more extensive and challenging integration requirements.

The number two reason for staying with the current WLA software is the anticipated “difficult migration of workflows” (27%) to a different WLA platform. Again, this is a much stronger argument for large enterprises (43%), than it is for midsize (16%) or small organizations (22%).
The Sources of Workload Automation Complexity

This study identified one central point of origination of today’s increase in WLA complexity: “IT projects initiated by business units” (67%; see Figure 20). Almost three quarters (72%) of large organizations named business units as the source for complexity. Nearly half (46%) of these large organizations mentioned “self service provisioning of jobs by developers” and “tighter SLA requirements” as key reasons for WLA complexity, both are variables that result from business unit demands. This is also the case for “deployment of big data applications” (41%) and the “self service provisioning of application environments by business units” (33%). In short, this study underlines the tremendous impact of business unit requirements on WLA, which in turn demonstrates today’s critical impact of WLA on corporate success.

Workload Automation and Big Data

Over two thirds of large enterprises (68%) and 59% of all study participants indicated that big data projects have increased WLA complexity (see Figure 21). Over half of large organizations (52%) stated that big data projects also made it more difficult to manage WLA-related SLAs, while only 31% of midsize enterprises and 34% of small companies agreed with this assessment. This is explained through the significantly greater complexity of large enterprise environments, amplifying the impact of big data projects on WLA. At the same time, big data projects have led to “increased resource requirements” for 56% of study participants, raising the importance of elastic and scalable WLA environments. Only 12% of respondents believed that big data would not have any significant impact on WLA.
**WLA as the Business Process Integration Hub for Big Data**

This study showed that only 8% of large enterprises have not yet taken advantage of big data analytics projects, while this is the case for 19% of midsize organizations and 17% of small companies. Big data projects often require the ongoing extraction and transfer of vast amounts of information from systems of record – CRM, ERP, CMS, accounting – and systems of engagement – email, social media, sensor data, websites – for processing and analysis to a distributed platform such as Hadoop. From there, data is extracted and stored in a data warehouse solution. The role of WLA for big data projects is essential, as the scheduling software automates and orchestrates most or all of the systems involved in the big data analytics project. WLA software constitutes the business-process integration hub that ensures that input and output data are reliably routed to the correct systems at the right point in time. Taking advantage of WLA for this purpose ensures that SLAs for big data workflows can be centrally managed. Approximately half of big data applications – Hadoop 46%, Cloudera Hadoop 55%, Horton Works Hadoop 64%, Informatica 57%, and IBM Cognos 63% – are integrated with and controlled by WLA software (see Figure 22). While this number is significant, it also means that the other half of big data applications is not controlled and synchronized by WLA software, making these applications susceptible to SLA challenges.

![Figure 22 - Degree of integration between big data applications and WLA](image)

Two thirds (64%) of organizations believe that they would benefit from “deeper integration of WLA with big data, analytics and BI tools” (see Figure 23). Over half of companies (55%) would like to have a “central dashboard showing data quantities and flows across the big data analytics process.” When looking at large enterprises, EMA finds that governing and managing big data becomes more difficult with increasing business size, which is why 70% of these large companies would like to have a central management dashboard. This goes in line with the observation that 54% of large companies would also like “adapters and connectors for more business applications” and even the “ability to ingest meta data,” while at the bottom of the wish list, is still desired by 44% of organizations. These data points show that customers demand new WLA capabilities that help reigning in the additional requirements that were brought on by big data. Interestingly, the availability of “big data and business intelligence connectors” is a decision criterion for only 14% of organizations when purchasing new WLA software. This starkly contrasts with the findings above (64% of organizations asking for deeper big data integration) and demonstrates that the initial selection criteria for WLA software may not always include sufficient foresight.
When given the choice in terms of how WLA software should facilitate the integration of big data workflows, the vast majority of organizations (82%) prefers the ability to rapidly integrate with third-party systems, based on easy to use APIs, to out-of-the-box integration. This shows that most organizations prefer the flexibility of a rapid integration kit to the turn-key experience of out-of-the-box connectors. This is due to the incredible variety of systems that can be involved in big data analytics and the fact that customers recognize that the more of these systems they integrate with their big data workflows, the more powerful their solution will be.

Only approximately one third (43%) of big data projects are centrally managed by IT operations, while another third (39%) are owned by IT and business units together (see Figure 24). In 17% of cases the business unit takes on all management tasks for their big data projects. The larger the organization, the more there is a trend toward business units managing big data projects. By nature, big data projects tend to become more and more business critical as they evolve. To ensure reliability, performance and disaster protection, these projects should be centrally managed by IT operations.

**Conclusion**

As the central business-process integration hub for big data projects, WLA must provide easy integration with all source and target systems. Only if the entire big data analytics process can be orchestrated centrally through WLA software, can SLA compliance be assured for rapidly increasing big data requirements.
Workload Automation and Cloud

Approximately half (43%) of organizations and even 79% of enterprises of the highest WLA maturity level are currently taking advantage of private or public cloud resources for WLA (see Figure 25).

“Resource elasticity” (57%) and “dynamic scalability” (54%) are the key business reasons for leveraging private and public cloud for WLA (see Figure 26). Interestingly “CAPEX savings” are much more important to large enterprises (42%) than they are to midsize (33%) or small organizations (22%). Especially when it comes to the number of agents required to run a large business, the initial expense for licensing these agents can be tremendous. “Provisioning speed” is the most important reason for using cloud for large companies (63%), while “dynamic scalability” is most significant for small organizations (66%). Overall, it is striking that there is more than just one main business driver for adopting cloud for WLA. The fact that “elasticity,” “scalability” and “speed” are the vital reasons for WLA taking advantage of cloud demonstrates that WLA is not the static discipline it used to be. WLA staff feels the complexity pressure from business units to react more quickly and flexibly. Cloud is the “vehicle” that enables speed and flexibility. In other words, the availability of cloud resources has opened up a completely new set of opportunities to make WLA more efficient. This automatically leads to the WLA team better being able to serve business units.
Based on these business reasons, the “automatic creation of additional server resources following increased demand” is the key capability offered by 43% of cloud environments (see Figure 27). For smaller enterprises the “automatic reclamation of unused resources” is the most common cloud feature. As expected, “automatic workload placement based on compliance policies” is the least common; however, at 37% it is still a surprisingly widespread capability.

Security is the key reason for not placing more workloads into the public (69%) or private (48%) cloud (see Figure 28). This trend is even more pronounced for the public cloud when looking at the CIO/CTO group (76%). “Compliance,” “cost” and “performance concerns” are the next most important considerations for not moving more workloads into the public or private cloud.
When drilling down deeper into compliance obstacles of placing jobs into the public cloud, EMA finds HIPAA (38%), SOX (30%) and FISMA (18%) to be the most important (see Figure 29). However, only one third (28%) of organizations do not have to worry about regulatory compliance at all. Larger organizations more often named HIPAA (48%), SOX (34%) and FISMA (30%) than smaller ones. These numbers show that vendors of private and public cloud are well advised to proactively address compliance concerns in a cloud context.

![Figure 29 - Regulatory compliance obstacles for placing workloads into the public cloud](image)

Ultimately, the IT Director role generally decides (in 47% of cases) whether specific jobs and workflows should be placed in a physical, virtual, private cloud or public cloud environment (see Figure 30). Only 19% of CIOs are involved in this decision. These numbers do not change significantly across company size. Workload designers and operators are typically not part of the workload placement process.

![Figure 30 - Who decides where workloads should be hosted](image)
How Cloud is Used

A surprising 60% of organizations are using private or public cloud to create “additional peak time capacity” (see Figure 31). Even more surprising may be that 55% of enterprises indicated that they leveraged cloud for the execution of “permanent production jobs.” Almost half of organizations (46%) use cloud for the “ad hoc creation of dev/test environments” and 41% for “low priority jobs.” These numbers contradict the common belief that cloud generally starts with less mission critical workloads and is often still limited to dev/text scenarios. This EMA research shows that cloud already is an important resource for WLA.

EMA found that 37% of organizations still have all of their workloads tied to specific physical hosts (see Figure 32). Half the study participants (53%) indicated that at least some workloads can be deployed to different hosts as necessary, while only 10% of companies can move workloads around freely between hosts.
For the 90% of organizations that cannot freely move all workloads, the majority named “improved job virtualization” (49%), “improved resource pooling (45%) and “more flexible security management” (44%) as the key obstacles that must be resolved before workloads can move freely (see Figure 33). Organizations are looking for a “job virtualization platform” that enables them to define workflows that are abstracted from their underlying infrastructure, similar to the way virtual machines are abstracted from their hosts. Due to the specific hardware, operating system and software requirements of batch jobs, this abstraction is often challenging.

The ability to automatically reclaim unused infrastructure resources is the most important future WLA-related cloud requirement (35%, see Figure 34). When drilling down into this number, it is interesting to see that 41% of IT operations staff finds “automatic reclamation of unused resources” important, but only 11% of CTOs/CIOs agrees. For the CTO/CIO role the simple “static creation of additional server resources” is highest up on the wish list. This is the case as the CTOs and CIOs believe that “automatic reclamation” is a problem that has already been solved, when only 32% of IT operations staff agrees.

**Conclusion**

WLA groups see the incredible advantage of private and public cloud and this research shows that a surprising number of production workloads already run in the cloud. In a next step, WLA software vendors need to provide easy to implement solutions for abstracting workloads from their hosts and for providing central governance, SLA management and security for these jobs.
Workload Automation and Analytics

A majority of organizations is currently able to include server (62%), database (57%), network (56%) and storage (55%) performance data into a health and performance analysis of their workloads (Figure 35). While these are generally positive numbers, the problem is that most of these organizations have systems and processes in place that require significant manual management and ongoing adjustments of warning thresholds. This manual component to managing workload health, security, compliance and performance leads to an overload of IT operations in days of an exploding number of IT projects initiated by business units.

Almost half of organizations are currently using or will be deploying some form of analytics for “SLA monitoring” (46%) and “capacity management” (45%). As Figure 36 demonstrates, more mature WLA customers show significantly higher adoption of these analytics capabilities.
In approximately half of these cases (47%) analytics capabilities are or will be “part of a separate software solution,” while in 41% of instances they are or will be “built into the WLA software.” Only 12% of organizations indicated that they do not currently have nor will they be deploying WLA relevant analytics capabilities.

The fact that mature companies are more likely to have analytics capabilities built into their WLA software (see Figure 37) demonstrates that this is a general trend that most organizations will follow, as their WLA groups mature. This trend may also be fueled by the fact that external analytics solutions do not sufficiently “understand” WLA-specific requirements.

Organizations generally believe in analytics as an important tool that can help better align workload automation with business requirements and are planning to further invest in analytics to achieve increased “operational efficiency” (60%), “security” (49%), and “compliance” (42%), as well as “better business insights” (39%) and “OPEX savings” (25%; see Figure 38). Only 8% of all organizations and 3% of organizations with the most mature WLA environments do not have plans to further invest in analytics. The latter group is significantly more aware of the business impact of predictive analytics in general.
CIOs and CTOs are more sure that their organization can quantify the business impact or cost specific to a job workflow failing (35% are completely sure) than their IT operations staff (15%, see Figure 39). In addition, organizations with more mature WLA departments believe in the ability to quantify the business impact of their WLA software to a much larger degree (47%) than companies with less mature WLA departments (0%).

![Figure 39 - My organization is able to quantify the business impact or cost of any specific job failing](chart)

**Conclusion**

Building checkpoints and control jobs into complex workflows and monitoring them with an existing IT operations management tool has worked well throughout the years. The tremendous potential of making WLA more efficient and effective in the face of today’s new challenges through the use of analytics capabilities is undeniable. Currently, we are still at a transition period, where organizations are intrigued by the capabilities of advanced analytics, but do not yet fully understand the disruptive potential of this technology. It is important to recognize that we are merely at the beginning of a revolution in enterprise IT operations that will be vastly fueled by analytics.
Workload Automation and DevOps

DevOps describes the ability of IT operations staff and developers to better communicate in order to overcome the typical antagonism between ensuring the secure and stable operation of a software environment and the need to constantly update applications to be able to offer the latest features to business units. To achieve this goal, there are two general requirements: 1) developers have to receive direct access to the software via API, CLI or GUI, and 2) there has to be a release lifecycle management system in place that prevents faulty code from being placed into production.

Almost half (46%) of organizations are enabling or will shortly enable developers to provision jobs in a self-service manner, as well as access and modify existing job workflows (48%). These numbers are significantly higher the larger the company and they drastically increase with the maturity level of the WLA department (see Figure 40).

![Figure 40 - DevOps capabilities by maturity level](image-url)
These figures are consistent with 46% of organizations investing in “continuous delivery of jobs and job workflows,” as well as in “collaborative development of job workflows” (see Figure 41). Again, a much larger share of more mature companies has invested in self-service capabilities, compared to the average.

![Figure 41- Self-service capabilities by maturity level](image)

Almost half of respondents (43%) would like to manage WLA workflows through Puppet or Chef (see Figure 42). Thirty-nine percent (39%) find this capability “moderately valuable.” As expected, Puppet and Chef integration is significantly more important for more mature WLA departments. These findings show that organizations now require the capability of flexibly managing job workflows across their lifecycles, similarly to code.
Conclusion
Organizations are ready to manage job workflows through their lifecycles, similarly to how they manage the continuous delivery of code. The more developers can directly take advantage of already existing WLA software, the more effective they will be at delivering business applications. WLA vendors must provide the safeguards and audit capabilities that are required to confidently offer these self-service capabilities.

The Importance of Mobile Management in Workload Automation
One third of organizations mentioned the availability and quality of “mobile access” as a key reason for potentially switching to a different WLA software platform. Over 80% have some form of mobile WLA monitoring and management capabilities already in place (see Figure 43). Large enterprises generally show more mobile WLA capabilities than small ones and the most mature WLA departments show approximately double the mobile capabilities compared to the least mature group. Almost half of organizations offer mobile WLA-centric “health and performance monitoring” (46%) and “monitoring of storage, network and servers” (46%).
When asked about what additional mobile WLA monitoring and management capabilities they would benefit from, 29% of organizations mentioned the need for a “dashboard for business units” (see Figure 44). When drilling down deeper into the data, EMA finds that the “ability to edit workflows” is important for large enterprises (28%), while it matters much less for midsize (14%) and small (19%) companies.

<table>
<thead>
<tr>
<th>Desired Capability</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dashboard for business units</td>
<td>29%</td>
</tr>
<tr>
<td>Troubleshooting &amp; root cause analysis</td>
<td>28%</td>
</tr>
<tr>
<td>Environmental alerts: storage, network and server</td>
<td>24%</td>
</tr>
<tr>
<td>Health and performance monitoring</td>
<td>23%</td>
</tr>
<tr>
<td>Ability to add new workloads</td>
<td>23%</td>
</tr>
<tr>
<td>Ability to edit workflows</td>
<td>21%</td>
</tr>
<tr>
<td>Mobile trouble shooting</td>
<td>21%</td>
</tr>
<tr>
<td>None of the above</td>
<td>18%</td>
</tr>
</tbody>
</table>

Figure 44 - Desired additional mobile WLA monitoring and management capabilities

When asked what types of mobile devices should be supported, Apple’s iPad (50%) and iPhone (45%) came out on top (see Figure 45). However, Android Phone (45%) was tied with the iPhone for second place. The biggest surprise was the fact that Windows Tablet (37%) had a strong showing, coming out ahead of Android Tablet (36%). Even Windows Phone with its negligible market share was on the wish list of 33% of organizations. Only 15% of companies stated that mobile device support was unimportant.

<table>
<thead>
<tr>
<th>Mobile Device Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>iOS iPad</td>
<td>50%</td>
</tr>
<tr>
<td>iOS iPhone</td>
<td>45%</td>
</tr>
<tr>
<td>Android Phone</td>
<td>45%</td>
</tr>
<tr>
<td>Windows Tablet</td>
<td>37%</td>
</tr>
<tr>
<td>Android Tablet</td>
<td>36%</td>
</tr>
<tr>
<td>SMS alerts</td>
<td>35%</td>
</tr>
<tr>
<td>Windows Phone</td>
<td>33%</td>
</tr>
<tr>
<td>None required</td>
<td>15%</td>
</tr>
</tbody>
</table>

Figure 45 - What type of mobile device support is important to your organization
Exactly half of organizations prefer mobile devices to access their WLA software through a Web browser, while 41% would favor a mobile app (see Figure 46). This is due to the fact that access via browser is easier to manage and offer across multiple mobile operating system platforms.

“IT executives” (53%) is the main group requiring mobile access to the corporate WLA software. Next come “infrastructure administrators” (45%) and “scheduling administrators” (40%; see Figure 47). Both groups need mobile access to ensure proper operation of critical job workflows.
Interestingly, “business owners” (24%) of workloads are at the top of the list of users requiring mobile access to the WLA software within the next 12–24 months (see Figure 48). This demonstrates the growing understanding of the business criticality of WLA by business units.

![Figure 48 - Who will require mobile access in the future?](image_url)

**Conclusion**

The importance of “mobile access” is higher than anticipated. This shows that the role of WLA as the central backbone for enterprise IT and a vital part of almost any business service is more and more widely recognized.

**Last Words: The Modernization of Workload Automation Is on Its Way**

This study has shown the tremendous pressure that is currently placed on WLA by a plethora of IT projects that are directly initiated by business units. This means that WLA needs “new tools” to cope with the exploding complexity. Remarkably, almost one third of organizations already feel the pain sufficiently to consider a migration to new WLA software. This number is much higher for organizations with more sophisticated WLA deployments, which means that WLA software vendors must act and help their customers reduce WLA complexity. Based on this study’s findings, the winner will be whichever software best helps organizations decrease WLA CAPEX and OPEX.
Appendix 1: Demographics

Sample size = 199

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing - All Other (Not Computer or Networking Related)</td>
<td>14%</td>
</tr>
<tr>
<td>Finance/Banking/Insurance</td>
<td>12%</td>
</tr>
<tr>
<td>Healthcare/Medical/Pharmaceutical</td>
<td>9%</td>
</tr>
<tr>
<td>High Technology - Application/Internet/Managed/Network Service Provider</td>
<td>9%</td>
</tr>
<tr>
<td>Retail/Wholesale/Distribution</td>
<td>8%</td>
</tr>
<tr>
<td>High Technology - Software</td>
<td>7%</td>
</tr>
<tr>
<td>Government</td>
<td>6%</td>
</tr>
<tr>
<td>Education</td>
<td>5%</td>
</tr>
<tr>
<td>Professional Services - Computer or Networking Related</td>
<td>5%</td>
</tr>
<tr>
<td>Consulting - Computer or Networking Related</td>
<td>4%</td>
</tr>
<tr>
<td>Aerospace/Defense</td>
<td>3%</td>
</tr>
<tr>
<td>Manufacturing - Computer Hardware or Networking Related</td>
<td>3%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>3%</td>
</tr>
<tr>
<td>Transportation/Airlines/Trucking/Rail</td>
<td>3%</td>
</tr>
<tr>
<td>Utilities/Energy</td>
<td>3%</td>
</tr>
<tr>
<td>Other (Please specify)</td>
<td>3%</td>
</tr>
<tr>
<td>Media: Publishing/Broadcasting</td>
<td>2%</td>
</tr>
<tr>
<td>Oil/Gas/Chemicals</td>
<td>2%</td>
</tr>
<tr>
<td>Professional Services – All Other (Not Computer or Networking Related)</td>
<td>2%</td>
</tr>
<tr>
<td>Consulting - All Other (Not Computer or Networking Related)</td>
<td>1%</td>
</tr>
<tr>
<td>Hospitality/Entertainment/Recreation/Travel</td>
<td>1%</td>
</tr>
<tr>
<td>Legal</td>
<td>1%</td>
</tr>
<tr>
<td>Non-Profit/Not for Profit</td>
<td>1%</td>
</tr>
</tbody>
</table>

Figure A: Organizations by Industry
Figure B: Organizations by number of employees

- 500 - 999: 18%
- 1,000 - 2,499: 9%
- 2,500 - 4,999: 10%
- 5,000 - 9,999: 31%
- 10,000 - 19,999: 500 - 999
- 20,000 or more: 31%

Figure C: Organizations by sales revenue

- Less than $1 Million: 3%
- $1 Million to under $5 Million: 6%
- $5 Million to under $20 Million: 11%
- $20 Million to under $100 Million: 29%
- $100 Million to under $1 Billion: 39%
- $1 Billion or more: 9%
- Not applicable, I work for a government or non-profit agency: 4%
- Don't know: 4%

Figure D: Study participants by role

- CIO/CTO (IT Executive Management): 17%
- IT-related Administrator: 15%
- IT-related Director (or Equivalent): 14%
- IT-related Manager/Supervisor (or Equivalent): 12%
- IT-related Software Engineer/Developer: 8%
- Infrastructure Engineer (network/systems): 7%
- IT-related Architect: 6%
- IT-related Vice President (or Equivalent): 6%
- IT-related Systems Analyst/Programmer/Engineer: 5%
- IT-security Operations Staff: 3%
- IT-related Project/Program Manager: 3%
- IT-related Consultant/Integrator: 2%
- IT-related Business Analyst: 2%
- IT-security Manager: 2%
Figure E: Location of study participants

- North America: 100%
- Asia-Pacific (APAC): 98%
- Europe-Middle East-Africa (EMEA): 42%
- Central & South America (Latin America): 34%
- Rest of World: 20%

Figure F: Geographic areas of operation

- Less than $1 million: 7%
- $1 million to less than $5 million: 12%
- $5 million to less than $10 million: 16%
- $10 million to less than $25 million: 15%
- $25 million to less than $50 million: 10%
- $50 million to less than $100 million: 14%
- $100 million or more: 19%
- Don’t know: 8%

Figure G: Annual IT budget
Figure H: Areas of expertise
About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst firm that provides deep insight across the full spectrum of IT and data management technologies. EMA analysts leverage a unique combination of practical experience, insight into industry best practices, and in-depth knowledge of current and planned vendor solutions to help its clients achieve their goals. Learn more about EMA research, analysis, and consulting services for enterprise line of business users, IT professionals and IT vendors at www.enterprisemanagement.com or blogs.enterprisemanagement.com. You can also follow EMA on Twitter or Facebook.