

# Data Center Automation: Market Landscape and Maturity Model

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Assessing the organizational readiness and market in data center automation

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## Summary

### Catalyst

The biggest costs associated with any data center are the operational running costs, of which the people costs are the biggest proportion. Therefore, the prospect of automation that can effectively perform tasks currently done by an employee is an obvious cost-saving benefit. However, the biggest restraining force to greater use of automation is the lack of trust in the technology, which is demonstrated by the need for a people-centric approval process. The other inhibiting factor is the focus on IT efficiency, and not on how to improve the business operations that use IT. In this report, Ovum introduces a market maturity model showing how the different stages are progressive, with analysis of the leading vendor's solutions.

### Ovum view

The Ovum maturity model for cloud adoption identifies the obstacles that must be overcome if organizations are to move to transforming IT service delivery, from an IT push to a business pull model. For most organizations, this means a change thinking, involving moving away from the simple cost-saving benefits of technologies such as server consolidation to the greater business agility benefits of cloud computing. With the role of the network being central to cloud computing, it is no surprise that automating network activities has a significant impact on the delivery of IT services. This becomes more obvious when the role of governance is introduced, when suddenly governance becomes more relevant to many more organizations in the context of deciding what services, how, and when to make the IT investments in the cloud. For many, the question becomes one of what happens to existing hardware (compute, storage, network) equipment. Therefore, the role of automation can in this context be considered as the glue that binds together the different elements and makes it look like one big flexible IT capability, even though under the covers it remains a mixed heterogeneous estate.

However, cloud computing will also need automation technology to deliver performance across this mixed estate. For example, if an organization has specific requirements, such as any workload must be executed on the cheapest platform, and if these costs change in real time, then automation technology is required to orchestrate this process, particularly if it includes migrating workloads between different providers. Finally, the link between automation and cloud governance is strengthened by the need to control and manage tasks outside the enterprise, creating a network of decision-making tools that can communicate and take the required action to ensure services are delivered in accordance with the expected outcomes. Automation cannot currently provide all these attributes, but is being developed as the “brains” of the cloud so that it becomes a future operational capability.

### Key messages

- The level of adoption of automation technologies depends on the organizational maturity.
- Market analysis shows automation is critical to delivering solutions to business challenges.
- Analysis of the leading vendor solutions identifies different approaches to deployment and messaging.

## Recommendations

### Recommendations for enterprises

The use of automation in the data center is a technology that all CIOs know they will require in order to manage the complexities of the demands in the digital economy. However, the technology associated with automation is not the issue, which for most organizations is a cultural and trust barrier. The manufacturing sector introduced automation as an answer to cost challenges when faced with lower-wage economies entering its markets. This perception that automation equals job cuts is still as strong today among many employees, and is potentially a barrier to organizations adopting even pilot projects with the aim of assessing the viability of automation of IT operations. We believe that the fear, uncertainty, and doubt (FUD) can be overcome through the use of education and the demonstration that automation in IT is all about enabling employees to focus on the value-added activities and removing them from performing repetitive, error-prone tasks.

### Recommendations for vendors

As organizations consider moving some or all their IT capability to a mixture of private, public, or hybrid cloud, the role of automations becomes central to the ability to treat these different resource pools as one effective corporate pool. Currently, the private and public clouds have limited ability to interoperate. Where this is possible it remains very vendor specific and requires the public and private cloud provider to use the same technology or standards. The use of more advanced automation technologies is being delayed because organizations need simple on-ramps that they can use to demonstrate the value of the automation technology, as well as demonstrate it is not threatening IT careers.

## The level of adoption of automation technologies depends on the organizational maturity

### Ovum's automation maturity model

Addressing the automation gap between manual ability and complexity is the biggest challenge faced by organizations today. Figure 1 shows the Ovum maturity model of automation technology evolution and adoption. This follows a simple six-stage process, where each stage has a specific deliverable and objective. These stages are not necessarily portrayed in a specific order or sequence. Instead, they demonstrate an evolution of technology and management thinking. However, Ovum believes that most organizations will recognize the challenges and follow the maturity stages. The final stage will require some elements of all the previous stages, and represents one of the key capabilities that will either advance or delay the wider adoption of cloud computing.

The model is categorized into four different areas that help understand how each maturity level relates to an organizations use of IT.

## **Technology**

The technology category refers to the how automation is used in relation to performing tasks, and how the technological advances in automation enable a greater degree of autonomy. The technology category can be seen as a reflection of organizational acceptance of loss of human control.

## **Operational Impact**

Operational impact deals with the cultural side of an organization and how automation will challenge the existing structures. Ovum believes that as automation maturity increases, the culture of an organization must also change so that organizational constructs such as departmental teams become less rigid and more fluid in how they function.

## **Capability**

The capability of automation considers the way in which the technology operates and integrates into the wider IT estate. The capability is one of the core aspects of automation driving where it can be used, and the value organizations can derive from it.

## **Market**

The market category considers how evolved the market is for each maturity level, and provides some estimation of when Ovum expects the maturity levels to become adopted by mainstream organizations.

These areas below demonstrate different characteristics in the six different categories of maturity.

## **Automated batch processing**

Stage one is the area best known as “job scheduling”, which is focused on executing operations in a sequence. Typically, this sequence involves the linking of tasks so that as information is processed, it is made available to subsequent stages for further processing. In large organizations, these automated execution processes can become extremely complex, splitting workloads into parallel streams across multiple systems, but ultimately it is a linear process, where a single element failure can cause significant problems downstream if an automated problem-detection and recovery process is not developed.

Change management in these automated processes is a very labor-intensive activity and is prone to error. Although this level can ensure that all tasks are executed and all data is processed, its use today is of limited value as a result of its reliance on known variable scripting. The developer must know what action flows into what task, and equally what the consequence of an error at each stage is. A consequence of this deep knowledge is that a reliance on key individuals creates islands of knowledge with specific expertise and does not support a collaborative approach due to the specialism.

## **Event-led workload automation**

Stage two is also known as state-based automation, where the tasks are not scheduled according to a pre-defined set of actions, but are controlled based on a defined set of responses to actions. The distinction is subtle but significant. Consider the operation to update the sales figures. In a pre-defined action model (stage one), when the sales team reorganizes regions, the model must be modified to accommodate any change (a move from four to three regions, for example). In a state-based model, a

simple rule needs to be changed so that only three regional sales files are needed before progression to the next operation. One of the implications of moving to a policy-based or state-based approach is the administrative burden of managing the policies, and the need to integrate this with the change process. Ovum finds this level the most commonly adopted form of automation in organizations.

**Figure 1: Ovum’s automation maturity model**

	Automated Batch Processing	Event Led Workload Automation	Intelligent Workload Automation	Complete Operational Automation	Cloud Automation	Integrated Business Automation
<b>Technology</b>	Task focused	Process focus	Self-learning technology	IT Operational focus	Considers infrastructure as a commodity	Business focused
	Script based	Policy based	Model based	Model based	Analytics based	Knowledge-based
	Linear	State-based	Increased set up time	Lights out computing	Dynamic multi-environment automation	IT at the speed of business
	Manual process error prone	Must be built into change process	More dynamic	Required new RACI model	Requires new approach to financing IT	Requires new levels of trust
<b>Operational Impact</b>	Creates islands of knowledge	Increased administration time	Reduced operational time	IT efficiency	Merging IT and business activities	Business efficiency
<b>Capability</b>	Cross hardware platform	Cross technology	Cross platform and technology	Cross environment	Multi environment	Cross environment and LOB
	Job scheduling	Workload scheduling	Proactive automation	IT operational automation	User defined automation	Business process automation
	Release management	Release automation	DevOps automation	Application lifecycle mgmt	Continuous delivery	Continuous delivery
	Limited ability to deal with complexity	Increased ability to deal with complexity	Designed for complex environments	Designed for IT dept efficiency	Designed for IT and selected business efficiency	Designed for business
<b>Market</b>	Widely used	Most common level of maturity	Technology just beginning to emerge	Used today in hyper-scale sites	Expected in 3 – 7 years	Expected in 5 – 10 years

Source: Ovum

## Intelligent workload automation

Stage three is the point where automation becomes self-learning and is typically identified by situations where even the policy (rule) management approach is becoming overly complex. Ovum believes this stage is only just beginning to mature and become adopted. We believe that crossing this stage will be the biggest technical challenge the industry must overcome. Successful technologies still may not provide sufficient confidence for wider adoption unless they can demonstrate three characteristics:

- Repeatability: actions are reliable and industrial in their strength to support highly scalable repeatable requests.
- Simplicity: the management and control can be performed with a minimum of administrative overhead.

- Interoperability: the development of common standards so that the heterogeneous data center can be easily “plumbed” together to support automation.

The major impact of stage three is the dramatic reduction in IT operational costs, and is linked with the growth of software-defined principles. To operate a successful software-define data center (SDDC) will require many of the traits of stage three capabilities. This stage also begins to identify the organizational changes needed for higher level of automation.

## Complete operational automation

Stage four represents the utopia of a completely human-free data center, where the management and delivery of services is performed at machine-layer speed, with a high degree of consistency. If we consider the analogy of manufacturing, the production line where no human is involved would be its counterpart. Although this capability is possible (via a homegrown approach), the question remains about why it is not more widely used. Ovum believes this is a combination of the scale of operations (in terms of the size of the data center) and the desire to retain some flexibility. Hyper-scale data centers all use some form of complete operational automation to manage the delivery of services because in such an environment it would be very costly without extensive use of automation.

The question of flexibility is the most contentious aspect. Many organizations believe that if they automate all operational activities, the change process will become overly complex, and will actually hinder the ability to meet the velocity of changed needed to support the business. Ovum believes that the approach taken by hyper-scale data centers demonstrates that a compromise can be accommodated. Typically, most of the operations are fully automated, including the resiliency fail-over, because the failure of hardware is built-in to the operational procedure, which then relies on manual replacement at the server level before an automatic fail-back. While this is not true “lights out” automation, it is a pragmatic interpretation.

## Cloud automation

Stage five represents a future use of automation where in the cloud world IT services and applications can be executed, delivered, and requested from many sources:

- The internal sources, also known as the private cloud, based on current internal data center technology and operations.
- The external, or public cloud, which is based on a shared tenancy model and delivered via the Internet from a services provider.
- A mixed hybrid model where the external resources are not shared with just anybody and can be restricted to an organization’s sole use.

These scenarios demonstrate that automation across firewalls and technology platforms becomes a requirement for enterprises to obtain maximum flexibility and therefore value from a move to a cloud-based model.

## Integrated business automation

If stage three represents a technology milestone, stage four is a cultural milestone. Up to this point the automation has been focused (although not explicitly, certainly by implication) on applications. With the advanced capabilities available in stage three, organizations can move to automate the delivery of

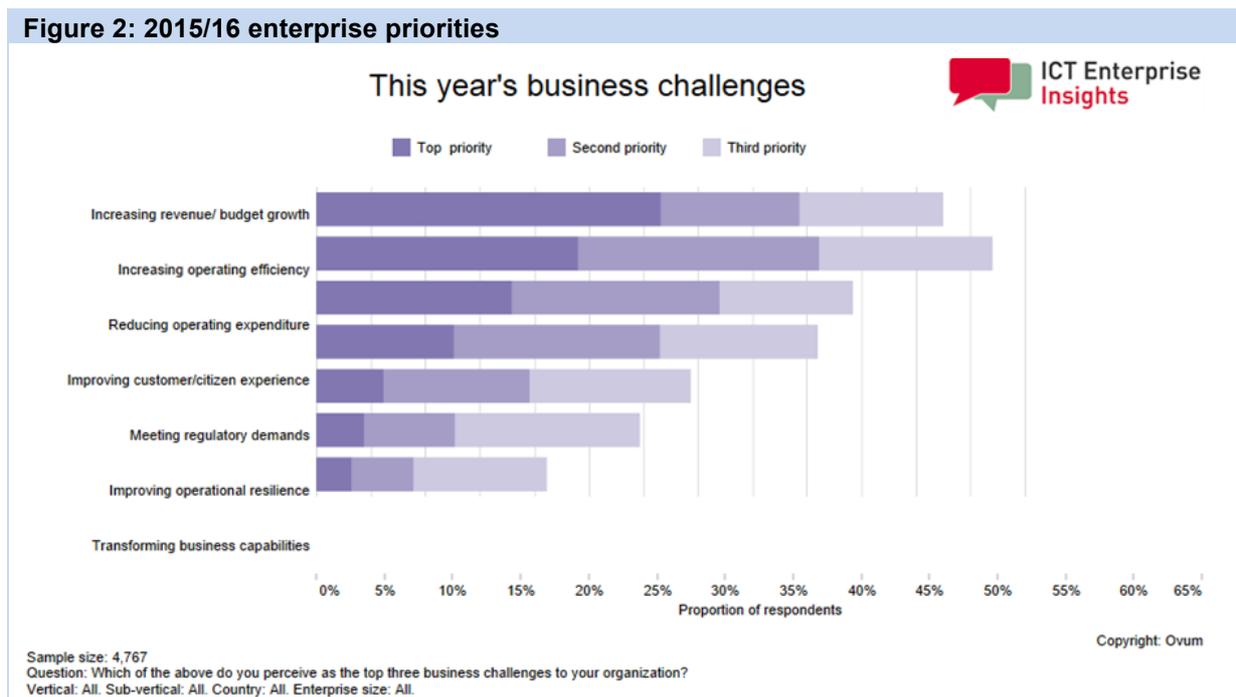
services, which are combinations of applications, data, and end users' activities. Ovum accepts that some simple service-level automation is probably in use today, but we believe that the true service-automation level is only attained when all services are integrated and automation can manage the complexities of delivery based on multiple variables, such as time, location, device, or method of connectivity.

## Market analysis shows automation is critical to delivering solutions to business challenges

### Operational efficiency is a major business challenge in 2016

Ovum's Enterprise Insights data 2015/16 (see Figure 2) shows the business challenges CIOs are being asked to provide solutions for in 2016 and beyond. The challenge that has the most top-three priorities is improving operational efficiency, and this is also second in terms of number-one priority. However, it is interesting to analyze these results when the top priority is to increase revenue, and the third priority is to reduce operating expenditure. This combination indicates that the IT budget is not necessarily being cut, but must instead be spent more effectively to generate greater business value (increased revenue or profit).

This analysis is supported by Ovum's ICT Enterprise Insights 2015/16 – Global: ICT Spend and Sourcing survey (n=6,275). This survey found that nearly 90% of respondents expect the IT budget in 2016 to either remain flat or increase compared to 2015. In fact, 25% expect to see a greater than 6% increase, while 37% expect between 1% and 5.99% increase, with 27% reporting between 0% and 0.99% increase. While in 2016, the overall increase in IT budgets increasing or remain flat is small at only 3% more than 2015, it is how the spending is distributed that is more important. For example, in 2016 an increase of 16% more organizations report an IT budget increase of over 6% compared with 2015.

**Figure 2: 2015/16 enterprise priorities**

Source: Ovum

## Analysis of the leading vendor solutions

### VMTurbo introduces an innovative approach to automation that provides the transition to higher levels of maturity

VMTurbo has developed an innovative approach to relate application workload demand to infrastructure supply, enabling enterprises to guarantee quality of service (QoS) while maximizing efficiency. At the core of VMTurbo's approach is a common abstraction data model that represents every entity as a buyer or seller of resources. These entities (for example, VM, container, app, host, storage array) make decisions, such as to resize, move, or provision, based on the exchange of a virtual currency representing the resources they consume or produce. The whole system is focused on delivering the business service priority, which is linked to a virtual budget. Therefore, the most important services have the highest budget, and at times when the environment is heavily utilized they can afford to garner the necessary resources to maintain service level guarantees.

VMTurbo extends this automation capability by enabling the developer to link the quality of service (QoS) to the demand for the application. This refinement to the system enables greater granular control over the resource allocation and therefore the cost of any service developed. The principle is that the desired future state is where the application level of service is maintained while ensuring the most efficient use of resources, and this equilibrium is kept by using a constant closed-loop control mechanism. This is based on the trade-offs between all the competing forces in the environment. The key forces that this dynamic approach balances are the cost of any service, the service quality, the performance of the application, the demand placed on the workload, the infrastructure efficiency and utilization, and the supply of infrastructure resources.

For example, consider the challenge of managing the patch-update process for a large estate of servers. VMTurbo understands the demand of the IO storm caused by all servers in a location downloading and applying patches simultaneously, and automatically throttles actions based on available resources to process them. This not only prevents applications from missing service agreements, but also stops unintended consequences, such as by preventing congestion on specific storage controllers that may impact other adjacent applications. While this capability can be achieved using other approaches, it is the simple and completely automated way that VMTurbo operates that makes its solution more efficient for IT operations.

This radical new approach to managing IT service delivery is well aligned with the principles of cloud computing and virtualized data centers. Ovum expects this approach to be refined over the next few years and expects it to align more closely with the approach that will drive the future of datacenter/cloud management. Ovum believes this will eventually enable it to be linked to the chargeback model that is beginning to be implemented in organizations as they consider adopting cloud computing. However, the transformation of IT financing is expected to take a number of years, because tools such as VMTurbo are rare, but in Ovum's view are required to make the transition a success.

## Appendix

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### Ovum Consulting

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Ovum's consulting team may be able to help you. For more information about Ovum's consulting capabilities, please contact us directly at [consulting@ovum.com](mailto:consulting@ovum.com).

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