
Server Virtualisation Scale-Up

Getting to grips with the practical reality

Tony Lock and Dale Vile, Freeform Dynamics Ltd, June 2011

Many organisations have gained initial experience with server virtualisation, but what can we learn about the practicalities of scaling up from those taking implementation to the next level?

KEY FINDINGS

Server proliferation is still a challenge, and consolidation is still work in progress

Despite widespread acceptance of virtual server solutions and their use to support server consolidation activities, a recent online survey of 458 IT professionals revealed that work is far from complete, and many organisations are still in the midst of server virtualisation projects.

Server virtualisation is now considered viable for a broader range of application types

The range of business applications and services for which server virtualisation is now considered to be an acceptable approach to service delivery is continuing to expand. A significant proportion of organisations participating in our study report that they are happy to consider almost all areas of IT service delivery to be suitable for virtualisation.

Organisations are unhappy with the cost of server virtualisation software licenses

Respondents report that the cost of licenses for virtualisation solutions is a specific challenge in their server consolidation projects. Project delays are one consequence of this, but anecdotal evidence also suggests that the issue is also encouraging some existing users to consider competitive alternatives, particularly when looking to scale up deployments.

Software vendors are still making deployment difficult in virtualised environments

IT professionals frequently report the licensing models proposed by some vendors of business applications and platform software such as database management and middleware to be unsuited to their virtualised environment, whilst significant numbers find the cost of licenses a challenge. Some vendors are still even resisting the provision of support for virtualised deployments.

Operational management of virtual systems can be challenging in live environments.

The ongoing management of virtual systems poses problems for the tools, practices and processes utilised by IT administrators. This is placing considerable strain on systems administrators as the operational use of virtualised systems expands. Failure to anticipate the management and tooling implications of larger scale deployments as organisations ramp up is a significant factor here.

Proper planning and expectation management is key to scale-up success

While vendors often position server virtualisation as the cure for all IT ills, it is important to be realistic about the results that can be achieved in the real world. Some organisations, for example, report the cost of virtual server projects to be higher than expected, with unplanned spend on storage and networking infrastructure, as well as software, causing budget overruns. Experiences also suggest that expectations around server consolidation ratios are often inflated to unachievable levels. All of this highlights that initial experiences with investigations and pilots do not necessarily translate directly to larger scale implementations. While the business benefits of virtualisation can be significant, the success of broader deployments is directly dependent on sound and realistic planning.

The study upon which this report is based was independently designed and executed by Freeform Dynamics and executed in collaboration with The Register news site. Feedback was gathered via an online survey of 458 IT professionals from the UK, USA, and other geographies. The study was sponsored by Microsoft.



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Introduction

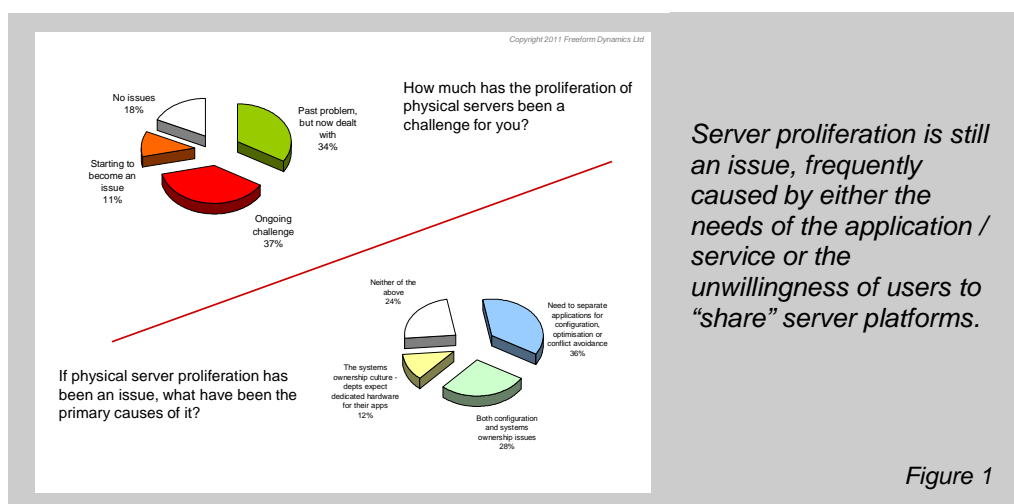
The majority of IT professionals consistently report they are happy with their knowledge of server virtualisation. They are comfortable with their understanding of where solutions are well suited in their evolving server architecture and perhaps more importantly, they also know which business use cases make sense in their organisations. To date, server virtualisation has been most widely deployed in server consolidation scenarios where economic and operational benefits are often to be found.

This report summarises the results of an IT practitioner study completed in the first quarter of 2011. During this, feedback was gathered via an online survey (see Appendix A) conducted by Freeform Dynamics in association with *The Register* science and technology news site (www.theregister.com).

Based on this input, we examine the views and adoption experiences of IT professionals and look at the state of play today with respect to the virtualisation of the server. We note that significant numbers of organisations are currently undertaking or considering server consolidation projects, and that one of the most frequently asked questions at the moment is what's involved in scaling up deployments. Real world experience is highlighting important areas that need to be addressed to allow wider adoption to be undertaken, most notably in the areas of management and software licensing.

Server Consolidation and Virtualisation

Server consolidation, usually coupled with the deployment of virtualisation technologies, has been at the heart of many projects over the course of the last few years. Many of these stemmed from an acknowledgement that the proliferation of physical x86 servers had become a costly problem. Figure 1 below highlights nearly half of respondents reporting the proliferation of physical servers to either be a current challenge or one that is starting to become an issue.



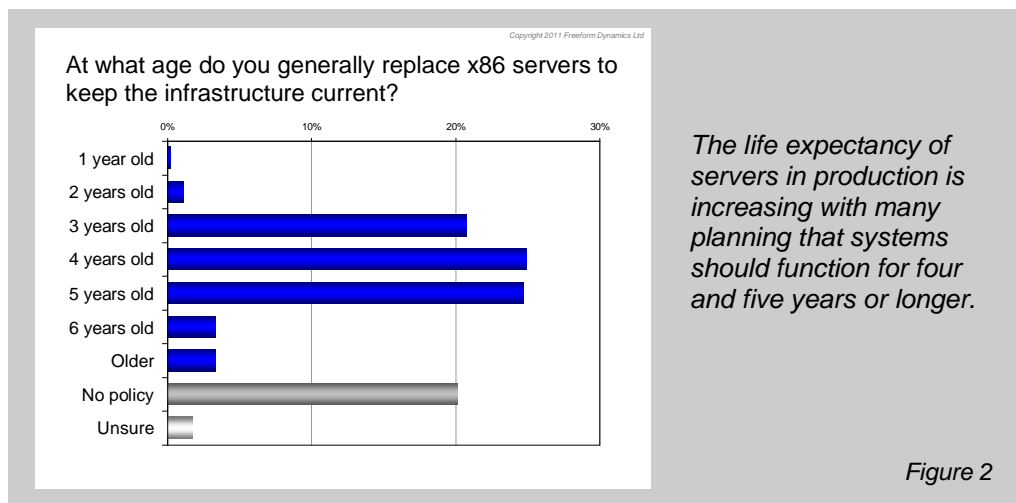
The chart also illustrates that two factors are widely recognised as being associated with the proliferation of physical servers. The need to separate applications for optimisation or conflict avoidance purposes is reported in nearly two thirds of cases, whilst 40% say it's primarily to do with a "systems ownership culture" where departments expect dedicated hardware to be used for their applications. This can be a major challenge for organisations looking to virtualise server operations across the entire estate rather than in application or service silos.

Server Hardware Refresh Cycles

The physical servers that form the backbone of x86 estates are today more robust and reliable than at any time in the development of the platform. Previously, servers were routinely replaced after two or three years whereas today x86 systems are now expected to operate for much longer.

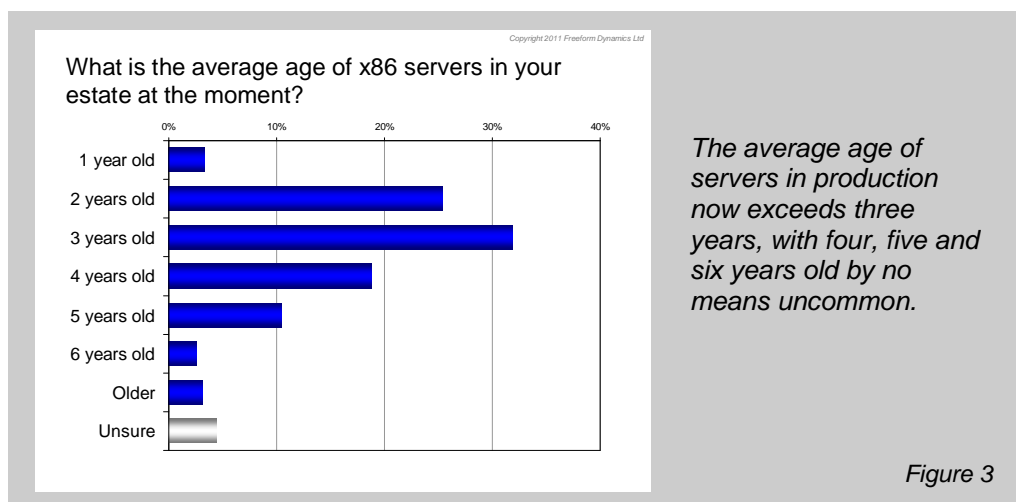
Figure 2 shows server hardware platforms now enjoy, at least on average, a life expectancy well in excess of three years. Indeed, more than half of those answering the survey report that they

anticipate servers to be replaced after more than four years of operation, with five years and longer by no means exceptional.



It is worthwhile noting that one organisation in five reports it has no fixed policy on server replacement. Such a lack of formal policy could indicate these organisations evaluate the requirements of each system and its current suitability on a case by case basis. It might also indicate servers are run until they fail or the application is no longer required. A deeper study of the results however, indicates that whilst these figures do not generally differ greatly by organisation size, the one exception to this is that small businesses (with less than 250 employees) are less likely to have a policy concerning x86 server replacements.

With the life expectancy of server platforms rising, there is a natural follow on question, namely “Just how old are the x86 server platforms in use today”? The answer given by respondents is just over three and a quarter years on average. As can be seen in figure 3, however, the average age of servers in some organisations is lower, but this is likely to reflect recent ‘catch up’ investment activity following previous interruption of upgrade cycles as a result of economic conditions.

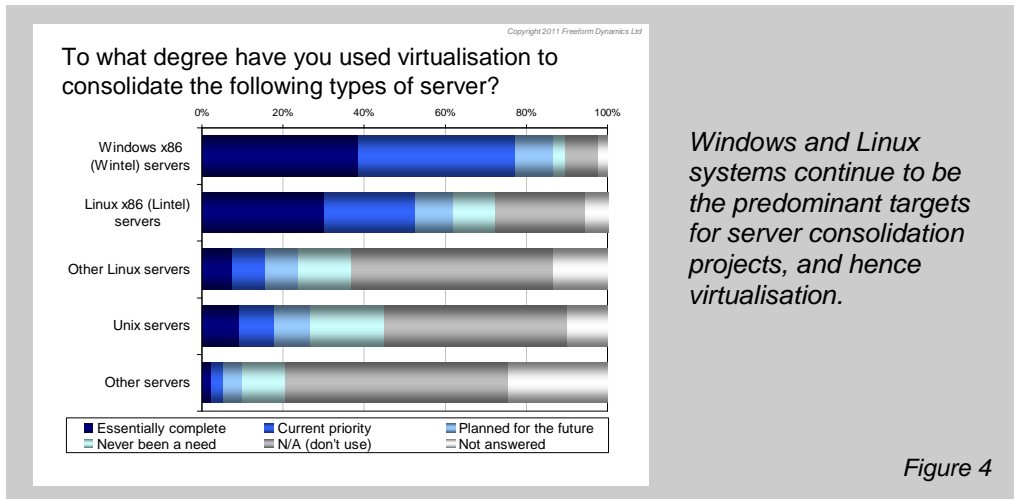


Findings such as this are significant as new servers are today architecturally better suited to operate in highly virtualised environments when compared with systems from even three or four years ago. While it is possible to virtualise older estates, serious scale-up of virtualisation activity at a more strategic level tends to be easier to manage with modern equipment.

There are only small differences in the age of systems when results are compared by size of organisation. Small businesses appear to have x86 servers that are on average slightly younger than those of both mid-size and large enterprises, but this may be a reflection of the nature of the sample. Given that the survey was executed via an online IT news site, tech-savvy professional services firms are likely to be over-represented among smaller organisation respondents.

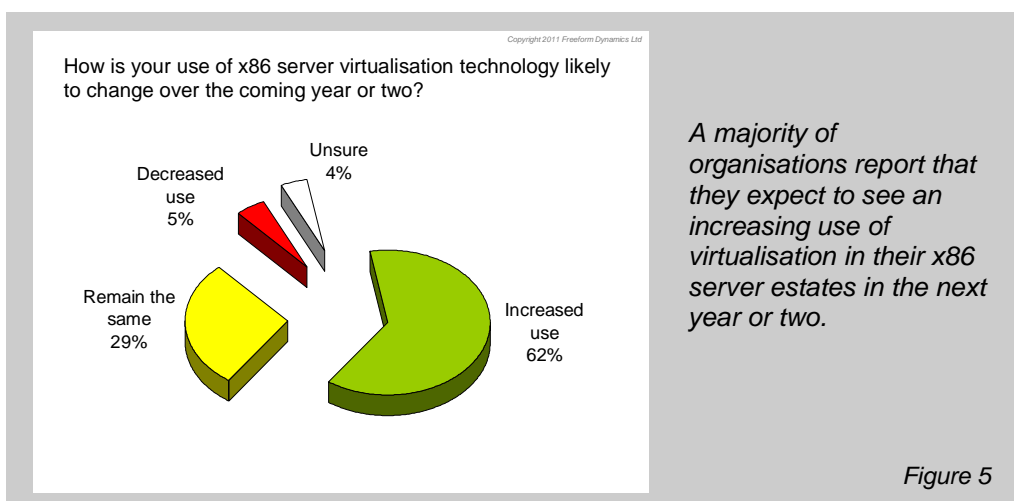
Virtualisation Usage and Projections

Looking at adoption progress, it is interesting to consider what stage organisations have reached in their use of virtualised systems. Figure 4 illustrates that amongst x86 estates, applications running on top of the Microsoft Windows operating system remain the most common target for virtualisation, some way ahead of Linux. This result almost certainly reflects the strong position Windows server holds in organisations of all sizes, especially as Web surveys on server computing tend to attract a higher proportion of respondents familiar with Linux platforms. Other results show that the adoption of server virtualisation is high across all scales of organisation, with extensive use increasing in line with size. This result carries on a trend seen in earlier studies^{1,2}.

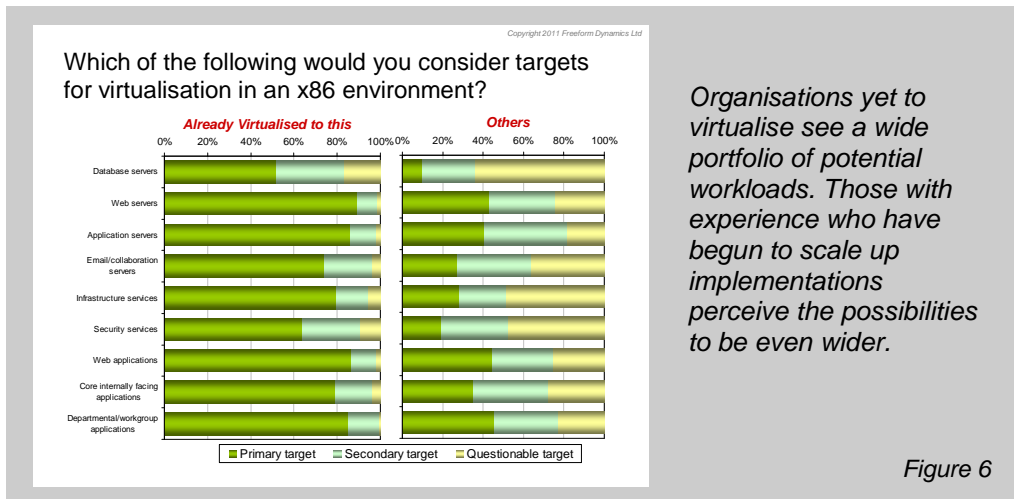


With virtualisation clearly playing a major role in the changing face of x86 server deployments, an important question is how organisations expect their use of these technologies to develop in the coming years.

At the highest level, a cursory glance at Figure 5 tells us that use of virtualisation is set to continue increasing over the short to medium term. Whilst just under a third of survey respondents state their use is likely to remain steady in the next year or two, more than twice as many believe they will make increased usage of server virtualisation over that period. Only 5 percent of those surveyed believe they will make less use of virtualisation going forward. Some of this will be down to poor execution as a result of inexperience and/or mis-deployment of the technology, some will be because organisations have taken virtualisation as far as it makes sense for them to do so.



Beyond the general positive trend, the other observation from the research is that services seen as being suitable targets for use in server virtualisation projects now encompass almost every type of application (Figure 6).



As we can see, application servers and web servers, always regarded as good targets, have been joined in the eyes of many respondents by infrastructure services, such as DHCP, DNS, security services, and even core internal business applications, workgroup servers and database systems. The perception of workloads perceived to be suitable expands even more widely as adoption experience increases.

With this in mind, it is worth spending some time looking at some of the practicalities and challenges to be considered as organisations scale up and scale out their deployments.

In the light of Experience – Challenges to be Overcome

Considerable server virtualisation is now taking place with large sections of the IT community taking an active interest in the area. Consequentially, real-world lessons have begun to emerge concerning the practicalities and challenges associated with implementing and running such systems.

We have already made reference to the second most frequent challenge experienced in server consolidation and virtualisation projects, namely certain business stakeholders are reluctant to give up their use of dedicated systems. To address this inhibitor, at least two approaches are being tentatively adopted. In one, IT can get business managers to accept policies mandating the use of virtual servers unless there are demonstrable reasons to do otherwise. An alternative is to employ some form of resource chargeback modelling whereby virtual servers offer significant economic benefits versus physical machines. Either way, it is important to confront this issue sooner rather than later.

It is interesting to note that “higher than expected project costs” and “lower than expected consolidation ratios” are regarded as specific challenges in consolidation projects, despite hands on experience growing with the years. Indeed, the ratios being achieved have not materially increased year on year (comparing this latest study to one conducted 12 months earlier), despite improvements to virtualisation platforms and server systems performance increasing steadily. These are areas where organisations would benefit from better guidance from the suppliers of virtualisation software and server vendors, as well as from the IT channel and solution partners.

Such guidance would usefully include infrastructure appraisal, as virtualisation projects will typically lead to additional pressure on storage systems and the corporate network. The key message is that it might be easy to get started with small scale pilot and proof of concept activity, but success with larger scale production rollouts is dependent on thorough planning, good architectural design and effective execution from a technology implementation perspective.

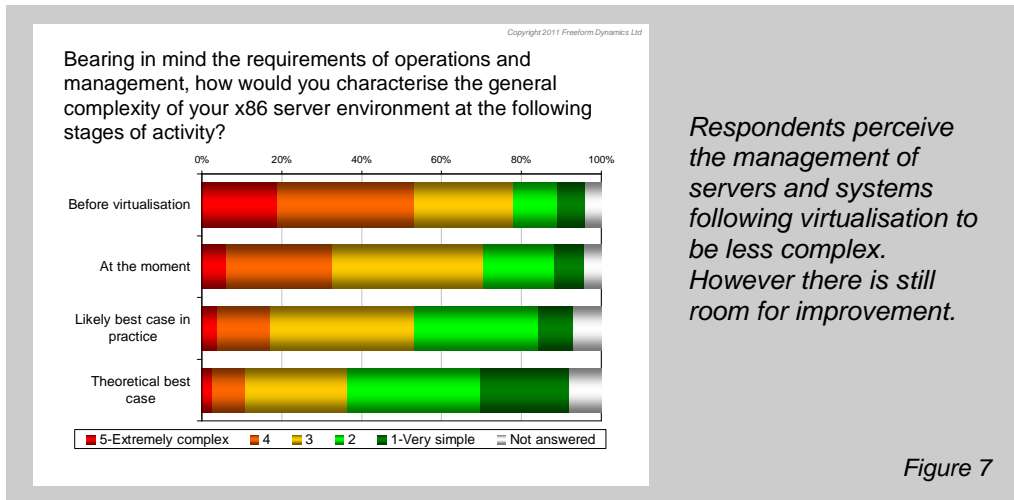
However, two topics, management and licensing are extremely visible amongst the challenges highlighted by respondents in our study and, given their importance, we look at both in the sections below.

Management

Many IT departments report being stressed by staff ‘overstretch’, the pressures to patch and maintain servers, the need to demonstrate operational efficiency, and a growing demand from the business to

meet changing requirements more rapidly. In essence, all of these amount to IT management challenges. With the use of server virtualisation growing, systems managers are understandably looking for ways to keep their virtual servers running effectively.

The importance of the management dimension is underlined when we consider that as virtualisation activity increases, physical machine sprawl can so easily be replaced by virtual machine sprawl. While arguably an improvement, it does mean that the theoretical reduction in complexity, which is often the key to improved management efficiency, is only partially realised by many organisations at the moment (Figure 7).



This underlines the need for customers to focus more on management, and for suppliers to assist in this area as much as possible with tools, best practices and even consulting skills.

In the meantime, this result is especially interesting as we know from feedback that organisations are looking for more from the tools they have available to manage virtual systems, as well as guidance on procedural best practice..

Licensing

Software licensing has always generated discussion with few IT managers satisfied with models and costs in this area. The results here indicate that “discussion” in the world of server virtualisation has almost morphed into active discontent. As virtualisation moves into the mainstream, software licensing has become the elephant in the room with few vendors ready to recognise how much it poses challenges to more widespread adoption.

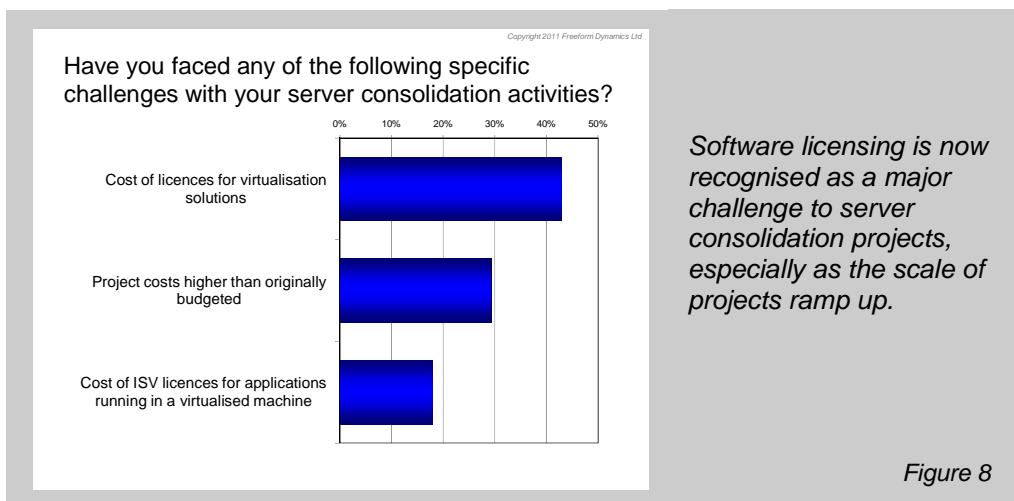


Figure 8 shows the cost of “licenses for virtualisation solutions” to be a challenge for more than two in five respondents. This is one of the first instances of clear dissatisfaction with the licensing models

and costs associated with the virtualisation software itself, rather than with the business applications running on top of the systems.

Application ISVs are also still in the firing line of customer discontent. Anecdotal evidence over the last two years has consistently highlighted that organisations have not been happy with the license models offered by ISVs in virtual environments. This is reflected here with nearly twenty percent of respondents pulling out explicitly the cost of application licenses on virtual platforms as a challenge.

But in many cases when it comes to ISV licensing, even if cost *per se* isn't seen as an issue, understanding how to stay legal in a more dynamic IT environment with loose physical coupling between hardware and software may not be a trivial matter. Software licensing is complex at the best of times and the ease with which virtual servers can be created, moved, replicated and taken down is likely to throw sharper attention onto license models and costs in the next year or two. Virtualisation vendors and application ISVs must address these matters to prevent server virtualisation scale up being inhibited.

Discussion and Conclusion

Across the world, pressure remains on business to improve its ability to respond to external developments such as changes in markets, evolving regulation and increased customer expectations. Against this background, many organisations are exploring how to drive operational and procedural change to help the business keep up, and this is as true in IT as it is in other domains. Such imperatives have caused many IT operations to undertake the consolidation of their back end server systems with the simultaneous ramp up in the use of server virtualisation as a major architectural foundation to achieve both greater efficiency and flexibility going forward.

In the early days of x86 virtualisation, there was some scepticism about just how far the approach could be pushed. As experience has been gained, however, the use of virtual servers is now regarded by many as suitable for the deployment of a wide range of business applications and services. Indeed what's emerged from the study reported here is that non-virtualisable workloads are beginning to be considered the exception rather than the rule as we look to the future.

Architecturally, many organisations will therefore soon reach a situation whereby all manner of backend systems will be virtualised. The next step, but one which has yet to really take off at the time of writing will see organisations make use of more flexible pools of servers in dynamic models where resources are allocated in real time responding to changing service demands. This is the so called 'private cloud' model of computing.

Meanwhile, as the scale of virtualisation activity grows, organisations are being faced with a wide range of management challenges resulting from the more dynamic and flexible nature of the infrastructure. These can typically only be addressed through the use of more capable administration tools and more suitable operational processes and procedures. But putting these in place can be tough, especially as we know organisations can find it difficult to make the business case for the acquisition of new management tools, especially at scale.

Another challenging aspect of virtualisation comes into focus when we turn our attention to the application layer. While virtualisation-enabled server consolidation is proceeding apace, many organisations have yet to consolidate their application portfolios. We know, however, that significant redundancy exists in most application estates, with multiple solutions often delivering the same or very similar business functionality. The opportunity is there now to use application re-platforming projects or other IT optimisation scenarios to consolidate here too, in order to keep the size of application portfolios to the minimum.

The potential benefits of such application rationalisation could match those achieved with server consolidation, with similar savings stemming from more efficient operational management, reduced staff training and, of course, a potential reduction in software licensing costs. This may become even more interesting and significant as ISPs evolve their licensing models to cater for virtual systems operations. If the political aspects of server consolidation are awkward in some organisations, getting business managers to agree to application consolidation is an order or magnitude tougher.

As virtualisation steadily involves into more dynamic 'cloud like' infrastructures, the need to address software licensing challenges posed by the often complex and rigid current models will be heightened.

Enabling the operation of virtual systems at scale, especially those with variable workloads, will for some vendors mean the development of new approaches to licensing.

Meanwhile, we encourage all of those looking to broaden their commitment to server virtualisation technology to think through the implications and plan accordingly. Many of the challenges we have discussed only become clear when you start to scale up, and we hope this report will help you prepare for what lies ahead.

References and further reading

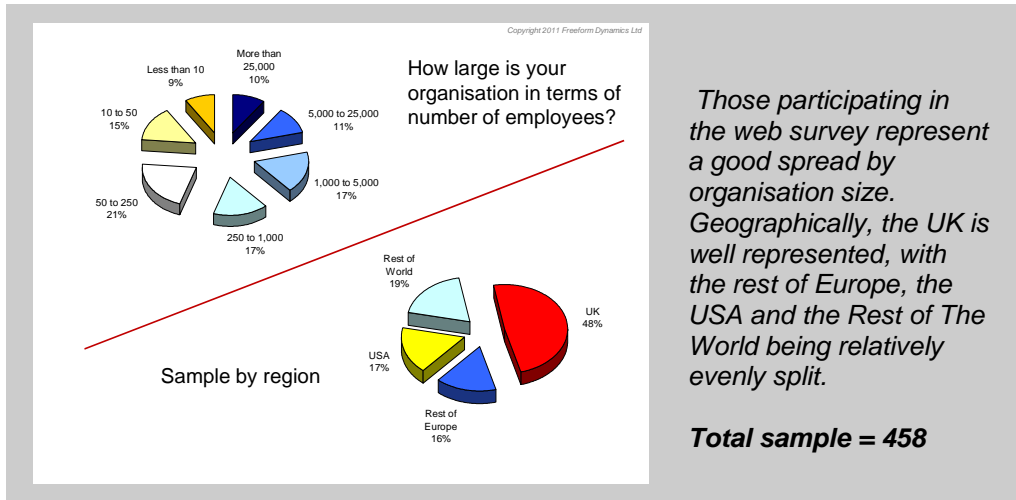
The following documents referred to in this report are available for free download from the Freeform Dynamics website:

- 1 x86 Server Virtualisation Check Point**
How dynamic should your data centre be?
<http://www.freeformdynamics.com/fullarticle.asp?aid=1241>
- 2 Server Virtualisation in Context**
Rationalising and optimising your x86 server estate
<http://www.freeformdynamics.com/fullarticle.asp?aid=789>

Appendix A

Sampling and Methodology

The research upon which this report is based was gathered through an online survey executed via a popular news and information site. The sample was made up predominantly of IT professionals with an involvement in virtualisation. A good cross section of industries from the UK, USA and other geographies was included, and the distribution by scale of operation was as follows:



Note that the usual caveats to do with online research apply to this study, namely that respondent profiles are self declared and the 'self-selection' sampling process is likely to have skewed the sample towards those with an interest in or knowledge of x86 server virtualisation. Neither of these factors, however, can reasonably be expected to have had an impact on the conclusions outlined in this report.

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See here for more information on Microsoft virtualisation solutions: www.microsoft.com/virtualisation/.

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