
Applied Desktop Virtualisation

Perceptions, reality and practicality

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“Virtualisation” is still one of the most talked about topics in IT today. The particular area of desktop virtualisation has been the subject of considerable marketing by a variety of vendors, especially in relation to the release of Windows 7 and an expected upturn in desktop refresh projects. But how far have users progressed in rolling out solutions in this area? And based on adoption experiences, what are the practical considerations when dealing with desktop virtualisation? Do the perceptions of potential users match the reality of the solutions available?

KEY FINDINGS

With desktop refresh now on the agenda, the virtualisation option comes into focus

Many organisations skipped a turn of the desktop refresh cycle as a result of economic pressure and reluctance to implement Windows Vista. With the prospect of purse strings loosening along with the broad acceptance of Windows 7, desktop upgrades are once again on the agenda. This opens the door to consider desktop virtualisation as a complementary deployment option.

But limited awareness and insight are holding up progress

Desktop virtualisation solutions have been progressing steadily, but the level of adoption over 2010 has still been relatively modest. One big challenge is the patchy understanding of the options. IT professionals have a good handle on established solutions such as Terminal Services, but insight into other important forms of desktop virtualisation is limited. As a result, those without experience often make false assumptions that stand in the way of progress

The divergence of perception from reality is clear in some very important areas

In the absence of practical experience, IT professionals tend to generally under-estimate the relevance and value of, and over-estimate the challenges associated with desktop virtualisation. In particular, those that have never deployed such technology are more likely to discount it as an option for more demanding user types, even though experienced adopters have often deployed to those same segments successfully. In reality, a blended approach is the most effective, based on mixing and matching traditional desktops with relevant virtualisation options to meet different user needs.

More attention needs to be paid to building comprehensive business cases

While everyone is looking for short term ROI, making a business case for investment in a comprehensive desktop virtualisation strategy based on direct savings alone can often only be achieved if a longer view is taken. This is because for server based virtualisation options in particular, significant up-front investment in server, storage and networking infrastructure is likely to be required, whilst the returns accumulate steadily over time. A more robust business case can be built by increasing the scope. The impact of enabling modern working practices such as hot-desking, efficient home and remote working, and secure mobile access, are often significant. Direct savings can potentially be made on real-estate and travel, as well as an increased contribution of value through the boosting of end user productivity.

Taking the broader view, another way to think of desktop virtualisation is therefore as a natural element of any working practice modernisation and efficiency programme.

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 192 IT professionals from the UK, USA, and other geographies. The study was sponsored by Microsoft.



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Introduction

Desktop virtualisation has attracted considerable attention over the course of the last year. Yet there is still a question mark over the degree to which this has translated to significant changes in how organisations deliver services to their users. For the IT community, it appears that 2010 was largely a year of consolidation, with many organisations biding their time as turbulent economic conditions limited room for change¹.

Against this background, the report presented here summarises the results of an IT practitioner study completed in November 2010. 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 particularly look at the variation between perception and reality when it comes to desktop virtualisation implementations. As we shall see, the findings suggest some significant differences between the expectations of non-adopters and the reality experienced by those that have deployed solutions in this area. In some respects it really is a case of myth versus reality.

Triggers for change

Discussing the practicality of desktop virtualisation now is very apt. Over the course of the last twelve months technology in this space has continued to develop and mature. However, the results of our survey suggest that this has yet to convince organisations to take the plunge into widespread adoption. We are still, therefore, very much in the 'early market' (as suppliers would say) for desktop virtualisation solutions, with a need for more general education and awareness.

This position is understandable. Global economic conditions have exerted a negative effect on the spending plans of many organisations in the western world. Tight purse strings have in turn limited the willingness of organisations to undertake any form of capital-intensive project, unless the monetary returns are both highly visible and achievable within a relatively short period. While the capital investment required varies by type of solution, comprehensive strategies to cater for the needs of different users typically require significant incremental investment in both hardware and software. It is therefore only natural that the economy has affected adoption rates.

Even as the purse strings loosen, however, there is another important issue that must be considered. Our latest research presented here, coupled with other studies performed by Freeform Dynamics over the last few years^{1,2,3}, provide abundant evidence that organisations frequently struggle to make a convincing business case for the adoption of desktop virtualisation based simply on the premise of saving money. Investment cases therefore need to go beyond this and look at areas of risk and value.

On the risk front we know from research³ that desktop estates are aging and that many organisations are now actively considering their options to modernise them. The motivation here is to avoid escalation of cost and user satisfaction issues. We then see more pressure coming from the regulatory front, particularly in larger organisations, and a general escalation in demand and expectation from the business. Let's explore these drivers in a bit more detail.

Aging desktops and the 'old car syndrome'

Prior to the release of Windows 7, organisations were happy to continue running XP. For a variety of reasons organisations did not feel that Vista was right for them, and together with the aforementioned funding issues, this encouraged many to defer the next round of periodic upgrade activity. The result has been a lot of desktop estates aging beyond the historical norm.

Like an old car, an aging desktop may be able to meet the needs of the user as long as nothing goes wrong and requirements for modern features or better performance don't arise. But when requirements and expectations do change, the limitations become clear and the 'old banger' starts to constrain what you can do. And whether it's an aging car or aging desktop PC setup, there comes a point when breakdowns start to occur more often, and fixing them becomes very expensive³.

Right now, for example, XP is approaching the end of its natural life and ISVs will be increasingly downgrading or discontinuing support for it. Meanwhile, much of the hardware in place at the moment will not run Windows 7 comfortably. Yet new printers, scanners, and mobile devices continue to enter the organisation and need to be connected up, and the demand from users to run the latest releases

of applications is ever present. The end result is either frustration or conflict as users are prevented from using new capability, or compatibility and support issues as aging platforms are pushed to or beyond the limit and breakdown more and more frequently.

Security, regulation and compliance

In many organisations, there are growing pressures to demonstrate the secure operation of the desktop and laptop systems deployed to workers. This stems from compliance related developments and a general heightened sensitivity to risk. High profile news stories of the mishandling and leakage of confidential information held on desktop/laptop equipment have added to this pressure.

The truth is that older desktop/laptop systems were not designed to deal with the risks that arise from the highly connected modern world in which mobile technology and storage capability is so pervasive. Put this together with the historical challenges of managing and securing remote devices, plus the fact that users have historically been reluctant to allow IT to actively manage 'their' devices anyway, and the pressure to change is growing considerably.

Changing user expectations

Availability of the latest technology in the high street means users increasingly have more advanced computing capability at home than they have in the workplace. This is changing expectations, with greater demands being placed on the desktop and more requests to use an expanding portfolio of handheld and tablet devices.

Indeed, users of all seniority, right up to the most influential in the business, now routinely expect to be able to be provided with any device they think will be useful for work purposes, frequently within days of those devices being released to the public. And if the company doesn't supply the equipment they think they need, it is now increasingly popular for users to bring their own kit into the workplace and expect it to be hooked up to company systems.

Whether using their own devices and connectivity arrangements, or equipment and networking capability supplied by their employer, we then have a general trend towards users routinely working from home and other remote locations. And, of course, when doing this, they expect access to all relevant business systems and information, and it frequently makes sense to give it to them to boost business performance and productivity.

Again, historical limitations raise their head. Traditional approaches to end user computing are struggling to cope with changing user demands from a capability, support, management and security perspective. Aging desktop estates can therefore represent a significant constraint when it comes to exploiting new and more flexible working practices. While it is possible to manage older desktop PCs reasonably cost-effectively and securely, it takes significant effort and commitment, and the reality is that few have implemented the robust procedures and comprehensive management tools necessary.

Together with the cost, risk and security implications of older desktop estates already discussed, this changing nature of the business environment is encouraging more organisations to look at desktop modernisation initiatives⁴. While much of this will be concerned with a 'like for like' upgrade from XP to Windows 7 running on modern hardware, there is a good case to look at the desktop virtualisation alternative⁴ to serve the needs of at least some of your users.

With this in mind, let's take a look at where the IT professional community is at the moment in terms of knowledge, experience and activity in this space.

Desktop virtualisation checkpoint

Desktop virtualisation comes in a number of different forms, but they are all based on the principle of decoupling the components that would traditionally all physically co-exist on a desktop PC. This means that hardware, software, data and user preferences can now all potentially live in different places, which in turn allows centralisation to boost efficiency and/or assist with management and administration. Each desktop virtualisation approach is based on centralising a different combination of components, giving IT professionals options for balancing efficiency with user experience.

At one extreme, it is possible to centralise pretty much everything in terms of management and execution, with just the user interface layer left on the physical desktop or laptop. This is the principle behind the well understood 'Terminal Services' approach that many will be familiar with. With modern virtual desktop infrastructure (VDI) solutions, however, we can optimise the blend of local versus

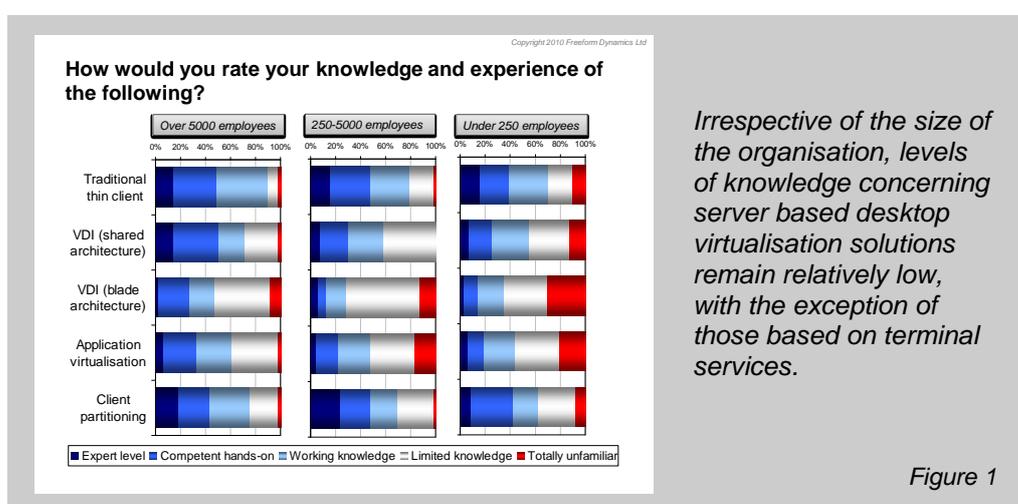
central execution of software, and user versus central IT driven management of configuration, preferences and security. The interplay between central and local data stores can also be better controlled.

In the study reported here, we considered common approaches to desktop virtualisation:

- Traditional thin client, e.g. Citrix or Windows Terminal Services
- Virtual desktop infrastructure (VDI) based on a shared server architecture
- Virtual desktop infrastructure (VDI) based on a dedicated blade architecture
- Application virtualisation, e.g. through application streaming solutions
- Client partitioning, e.g. with multiple virtual machines running on the same desktop PC

These approaches are summarised in Appendix B for those who need an introduction to them or a reminder of the options available.

The first observation from the research is that levels of knowledge and experience of most desktop virtualisation options is limited in organisations of all sizes (Figure 1).



We can also see that contrary to popular opinion, IT professionals in smaller organisations do not appear to be far behind large enterprise IT departments in terms of their level of insight.

That said, we know that there are a large number of small services companies represented in the survey sample, and that their professional interests are clearly aligned with understanding the latest developments in solutions that may be useful to their client base. But it is true to say that these services companies also have a huge impact amongst small organisations that form their customer base, as smaller organisations with little or no IT expertise tend to turn to them for advice and solutions. Their perceptions and experiences are therefore extremely important.

Bearing in mind the natural skew of online surveys towards those with a knowledge of or interest in the topic being investigated, the picture we see here undoubtedly overstates the level of competence and insight out there, and is consistent with the previously discussed notion of it still being early days for desktop virtualisation.

When looking at the degree to which various desktop virtualisation solutions have been deployed inside organisations, this notion is further confirmed. Again, we need to bear in mind that the numbers we are looking at from this study will be exaggerated because of the self-selecting nature of the sample. However, the data does legitimately illustrate that, despite the difference in knowledge levels between small, mid-size and large enterprises not being huge, the variation in actual deployment levels is greater, with significantly more activity in the higher size bands (Figure 2).



As might be expected, larger organisations are more likely to be using any of the available desktop virtualisation solutions.

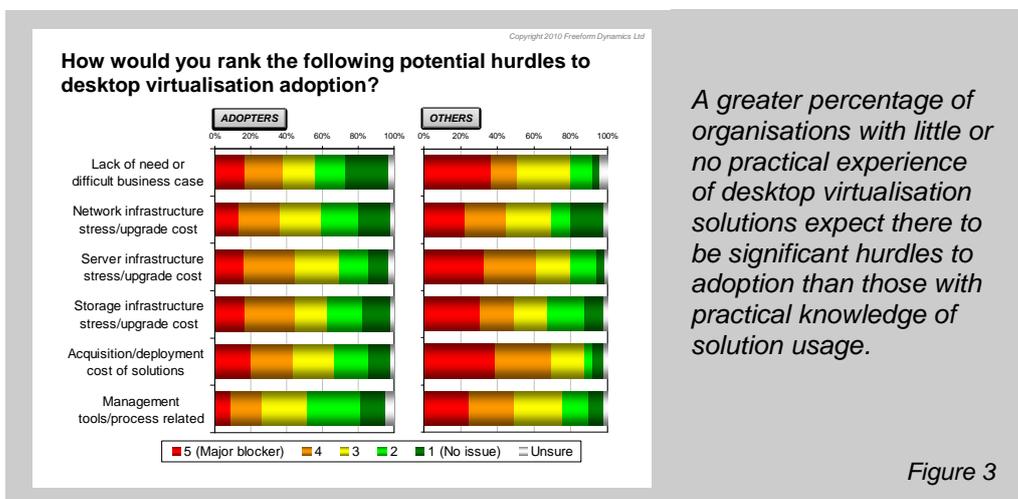
Figure 2

While we have not shown it here, the results from this survey are strikingly similar to those of a year earlier¹; yet another indication that the rate of uptake of desktop virtualisation in real-world deployments has yet to ramp up significantly.

This raises the question of what's holding up progress. After all, certain organisations have already started down the desktop virtualisation route successfully, so there must be some value here. In order to get a handle on this key question, let's look at some of the concerns highlighted in our survey, and whether or not they relate to real issues or simply uncertainties and misconceptions.

Barriers to progress – myth versus reality

Perceptions abound when talking about the hurdles that lie in wait of organisations looking to deploy any form of desktop virtualisation, but views of potential hurdles vary significantly between those with and without implementation experience (Figure 3).



A greater percentage of organisations with little or no practical experience of desktop virtualisation solutions expect there to be significant hurdles to adoption than those with practical knowledge of solution usage.

Figure 3

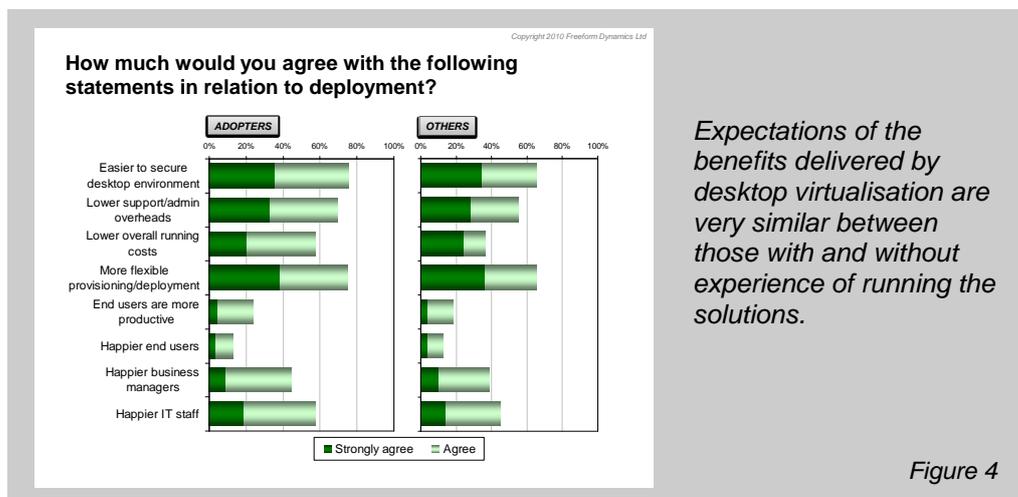
In many ways, the picture we see here is encouraging for those yet to embark on desktop virtualisation projects as the experience of their peers who have gone before shows that people may be over-estimating the degree of challenge. Indeed, looking across potential inhibitors in general, those without experience are twice as likely to perceive there to be major blockers to progress.

Having said that, people with experience of desktop virtualisation are not saying it's all easy, and do often acknowledge some real challenges. Matters of cost surrounding the required upgrades to servers, storage and networking systems rank high amongst these.

On a specific point, it is interesting that most adopters say the business case is easier to make than others anticipate, but there are clearly still issues in this area. This leads us on to the question of benefits.

Homing in on the benefits

When it comes to benefits, the views of those with and without experience are much closer to each other, suggesting that the potential contribution desktop virtualisation can make was actually reasonably well understood within our survey sample (Figure 4).



Improvements achievable include more flexibility in desktop provisioning, better security, and lower overheads on the support and maintenance side of operations, an area long understood to be an expensive challenge, but one where few people have a solid grasp of the economic reality. Consensus is also to be found with over half of all respondents expecting the cost of running desktops to be reduced.

The other interesting observation from Figure 4 is that the happiness of IT staff and business management are both rated as far more likely to be achieved than improving the satisfaction of end users. This is significant because in general terms, projects are much more likely to receive funding if they positively impact all three of the main constituencies – IT, business management and users.

The relative weakness of the proposition to users is an area that needs to be addressed. The history of PC usage in business is littered with stories of user frustration and dissatisfaction, often as a result of locking down PCs as part of centralised management policies. With the desktop being the point of access to the infrastructure as a whole, this can undermine the value users realise from IT in general, as well as negatively affecting the internal reputation of IT, which has consequences in terms of freedom, funding and political comfort.

The low prominence of user benefit could be indicative of those surveyed, mostly IT professionals, being more aware of their own needs and those of the senior management to which they are accountable. Another factor could be that most experience to date, as we have seen, relates to the 'Terminal Services' approach. Many an IT department has seen a backlash from certain types of user when their personal control over the desktop has been taken away because IT has centralised everything through the deployment of a traditional Citrix or Terminal Services architecture in a 'heavy-handed' and indiscriminate manner.

Two key points drop out of this:

- Historical experiences with traditional approaches are not indicative of what can be expected today with a properly implemented solution. The range of approaches now available (Appendix B) means we no longer have to 'force fit' every user into the same delivery model.
- The key to success is understanding your user community and deploying the right desktop delivery options to the right groups. Implicit in this is the notion that one size does not fit all, and that not all users are necessarily natural candidates for a virtual desktop.

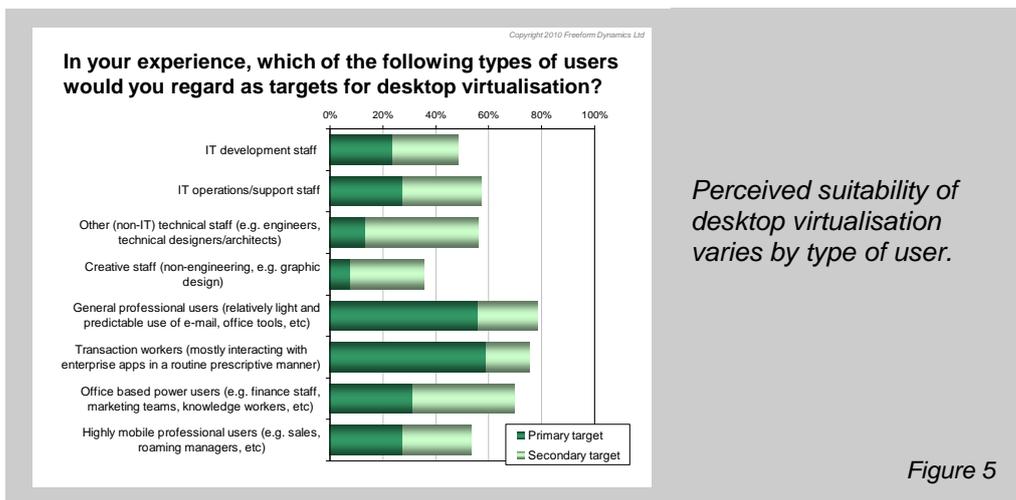
With this in mind, let's look at the question of user targeting in a bit more detail.

User segmentation and targeting

To this point we have talked about the virtualisation of the desktop in a generic way with little consideration of which types of user might be suitable candidates to run with any of the different solutions now available. The fact that modern solutions offer different benefits and fit different user requirements puts user classification at the heart of successful projects. Those with experience emphasise this. The correct deployment of solutions to appropriate users means that service quality should be unaffected, if not actually raised

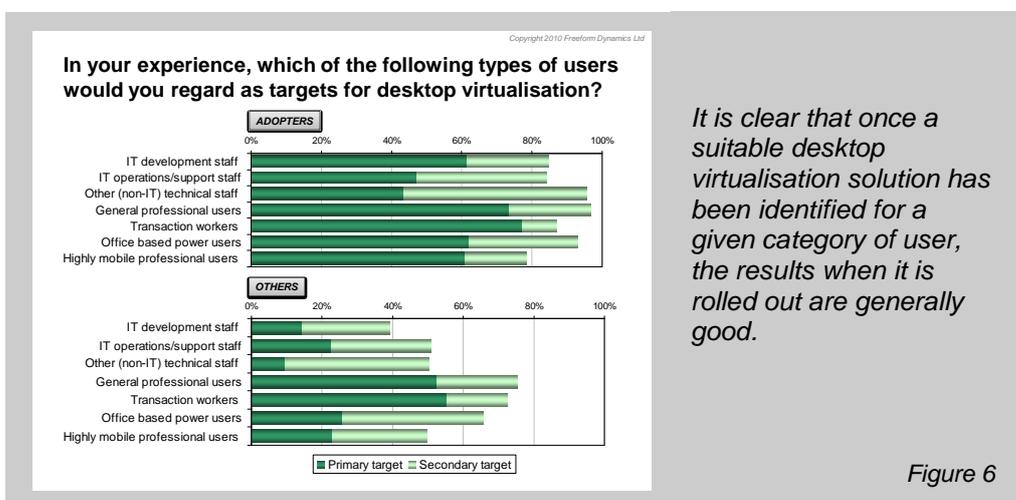
Horses for courses

Overall, there was a general consensus among all respondents on where it makes sense to put the emphasis when it comes to the targeting of user segments (Figure 5).



Transaction workers that spend much of their time working in a few specific screens from an enterprise application have always been a natural fit, even for traditional thin client solutions. For those interested in going down the virtualisation route, however, it is encouraging to note that very broad groups of mainstream office workers are now also seen to be suitable targets. We also see evidence that even the needs of office based power users and some mobile users could be served through virtualisation, verifying a growing appreciation that options such as application streaming based on local execution can be used to meet the needs of demanding and disconnected users.

Of course what we are looking at here is a generalised view of where to target initial activity. But how far can desktop virtualisation be pushed? We can get a feel for this by looking at the success of those that have deployed to specific groups. When we do this, it is clear that once a suitable desktop virtualisation solution has been identified for a given category of user, the results when it is rolled out are generally good – and this, surprisingly, applies to all categories (Figure 6).



In practice, each of the different solutions available to allow the implementation of desktop virtualisation has a different set of service qualities and challenges. Individually, they are therefore better or less well suited as an option for different classes of worker, so it is important to ensure that user segments receive the best solution for their needs, which may in some cases mean excluding them from desktop virtualisation projects should irreconcilable challenges exist.

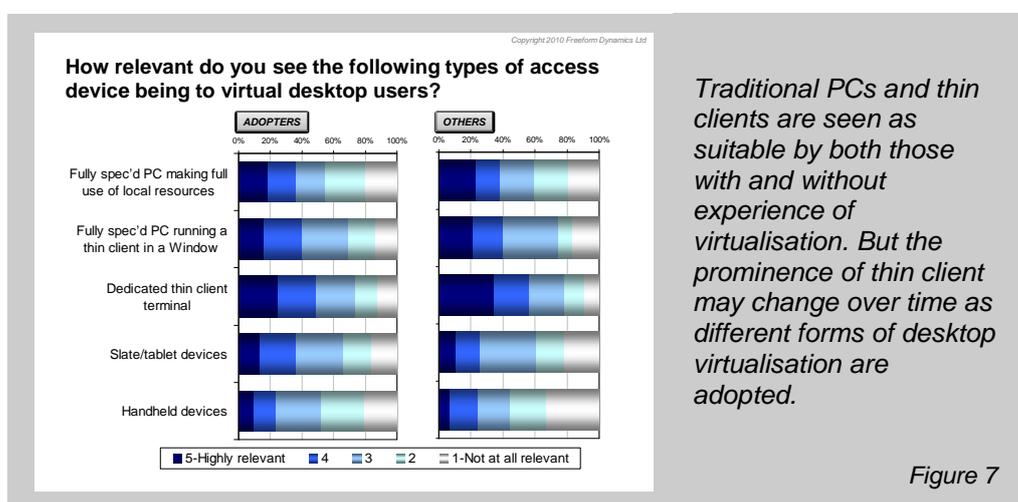
A more complete discussion of the mapping of different desktop virtualisation solutions to user categories can be found in our mini-guide entitled “Evolution of Desktop Service Delivery”, which is available on the Web as an eBook⁴.

In the meantime, one of the factors that distinguishes user segments is often the device or device mix that they use. While terms such as ‘desktop computing’ are generally acknowledged to include both static ‘tower’ type machines and traditional laptop/notebook PCs, when looking at an overall end user computing or access strategy, it is important to consider the other types of device commonly in use such as handhelds and slates.

This brings us to the question of which device types work well with desktop virtualisation?

Access devices and virtualisation

It is no surprise that both traditional PCs and Thin Clients are generally seen as suitable for virtual desktop solutions (Figure 7).



On the topic of dedicated thin client devices, which clearly stand out more than other devices, when deployed appropriately to suitable users these have significant acquisition and operational cost advantages associated with them compared to standard desktops. However, we need to bear in mind that most of the familiarity and experience of server based virtualisation declared by respondents was to do with the Terminal Services type of approach, with which thin clients are traditionally associated. As other forms of client virtualisation such as application streaming gain momentum, we would expect fully spec'd PCs to figure more prominently to cater for the needs of power and mobile users.

When it comes to the consideration of tablet and handheld devices, only a slightly higher proportion of experienced users see these as being suitable in the context of virtualisation. This is perhaps indicative of the still very limited adoption of such tools for everyday business use.

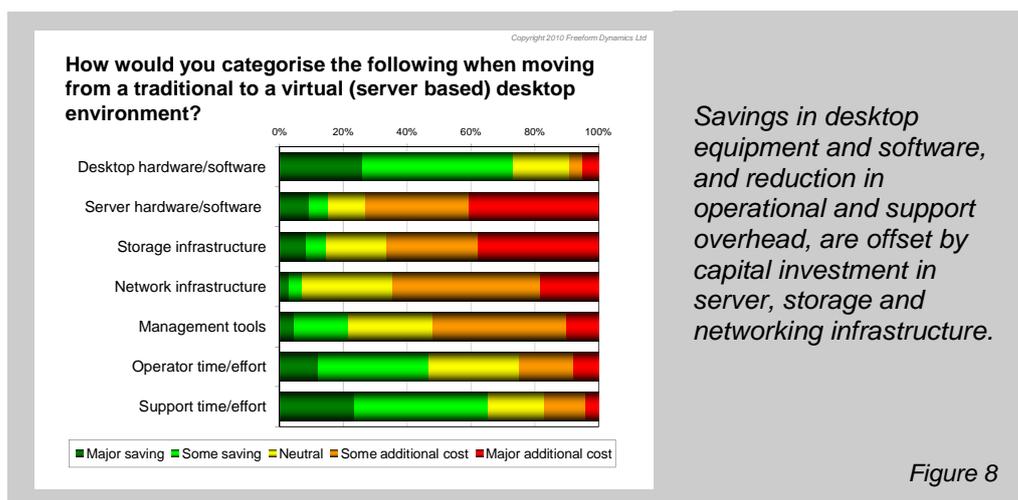
It will be interesting to see how views in this area develop over the next twelve months as the so-called “consumerisation” of IT and the expectation of users to be able to utilise any new device takes an ever-stronger hold on perceptions in mainstream businesses. Indications from IT professionals suggest that in many instances it is very senior managers that drive internal adoption, or at least IT acceptance, of new devices such as the latest tablets and handhelds. It is very difficult to say “no” to the CEO, MD or CFO.

Mentioning the CFO, the last area we need to spend some time on is the cost side of things.

The financial perspective

When we consider the direct financial implications of a desktop virtualisation initiative, there are two dimensions that are important – costs incurred and savings realised. The notion of 'spend to save' will be very familiar to those in IT that have been involved in prioritising investments over the past two or three years in particular. In an ideal world, when the arithmetic is done, the bottom line would come out with an overall net saving, but is this true for desktop virtualisation?

The evidence from those who expressed an opinion suggests that it is swings and roundabouts from a financial perspective. While there are clear savings to be made on desktop hardware, the optimisation of application testing and deployment, and the reduction in ongoing operational and support overhead, in order to achieve these benefits it is typically necessary to invest significantly in server, storage and networking infrastructure (Figure 8).



Behind this picture there were a few differences between experienced and non-experienced users, e.g. on balance those who had deployed desktop virtualisation generally indicated a higher level of saving across the board, but there was general agreement on how the costs and savings were distributed between the elements listed.

Anecdotally, the feedback we have received consistently from organisations that have deployed desktop virtualisation solutions is that it is best to assume overall cost neutrality over the typical three year investment appraisal period. A key consideration, however, is that the costs are front end loaded whereas the savings accumulate steadily over time. Of course there will come a cross over point, at which time there will be a net ongoing contribution, but when that is very much depends on how efficient your operation was to start with. There is an argument that desktop virtualisation initiatives almost force a review of policies, procedures and skill sets, which in itself leads to efficiencies that have nothing to do with the technology per se. Security management and software deployment discipline are examples here. The upshot is that you need to do your sums on the bottom line.

Discussion and conclusion

The results of the study presented in this report indicate that IT professionals generally 'get' the point of desktop virtualisation and understand where to look for IT and business related benefits. There is, however, a need for more knowledge and awareness of the practicalities, especially when it comes to understanding the newer options that are available, and identifying which of the solutions, or combinations of solutions, are most likely to meet the needs of particular groups of users.

The mixed news is that some gaps exist between perception and reality. There are clearly areas in which the views of the uninitiated differ significantly from the experiences of those who have already deployed solutions. On balance, those without experience are under-estimating the benefits and over-estimating the challenges. Looking at this positively, it means that those who embark on desktop virtualisation initiatives are less likely to run into nasty surprises and more likely to see results that exceed their expectations. On the negative side, the perception of investments in this area being harder to manage and generating less value than is actually the case means that many who could

possibly benefit from desktop virtualisation solutions may not get as far as even investigating them properly.

The message here for the vendor community is to perhaps switch emphasis in their messaging from the 'why' of virtualised desktops to the 'how'.

Having said this, indications are that difficulties often encountered in making the business case may be down to too much emphasis on cost with some important areas of end-user benefit being overlooked. This is underlined by the financial realities of implementing comprehensive desktop virtualisation initiatives. While savings will accumulate over time, there is no getting away from the significant upfront capital investment that is typically required with anything other than selective tactical deployments.

The neutral or delayed financial payback makes it critical to broaden the business case to areas of benefit, particularly highlighting desktop virtualisation as an enabler of modern working practices and a mechanism to deal with ever increasing user expectations. Even though you may spend money to put the necessary IT infrastructure in place, the enablement of hot-desking, safe and efficient home and remote working, and secure mobile access could indirectly lead to significant savings on real-estate and travel, as well as boosting user productivity while avoiding additional risk.

The point is that desktop virtualisation is a natural element of any working practice modernisation and efficiency programme, and provided you cast the net widely enough when looking for benefits, can drive significant savings within the business. And that's without trying to measure the benefits that result from more flexible working in general as the activities of sales teams, customer services teams, and so on, are optimised.

Beyond these areas, introducing a virtualisation approach into the end user computing and access domain will make managing the march of consumerisation much easier. The writing is on the wall already with the influx of personal handhelds and slates into the workplace, and IT departments are unlikely to be able to stop this trend - particularly as senior managers are one of the groups most likely to ask for their latest gadget to be hooked up to the corporate network. Meanwhile, there are no indications that the use of rich desktops, however they are delivered, will diminish significantly. It is anticipated that users will simply seek to employ a broader range of devices, and it is this extension of the hardware base that will increase the pressure on IT unless new approaches are adopted.

But to be successful, organisations must take a methodical approach to evaluating their position, reviewing the options, then planning and executing their desktop virtualisation activity. As part of this, we would recommend the following steps as a starting point for your planning process:

- Do your homework on modern desktop virtualisation technology. If it is a while since you have looked at the area, you might be surprised at what you find. In particular, make sure you understand the pros and cons of each type of approach.
- Categorise your users into discrete segments with similar requirements. This may be based on their usage patterns, the nature and mix of the applications they run, their location, their level of mobility, device requirements, and so on.
- Identify which desktop virtualisation solution, or solution mix, is most likely to meet the needs of each user segment, if any. Remember that traditional desktops remain a valid option and might still be the best for some users.
- Evaluate the strength of the business case for migrating users to virtual desktops on a segment by segment basis. The objective here is to look at the pros and cons from a cost, risk, disruption and value perspective. You can then prioritise and scope objectively.
- Architect the solution for each category of user based on best practices wherever possible, and always bearing the bigger picture in mind.
- Put in place appropriate operational procedures, including maintenance and support, then educate and communicate.

With this in mind, we hope this report has been useful, and in the spirit of community under which Freeform Dynamics operates, we would welcome any feedback you might have.

References and further reading

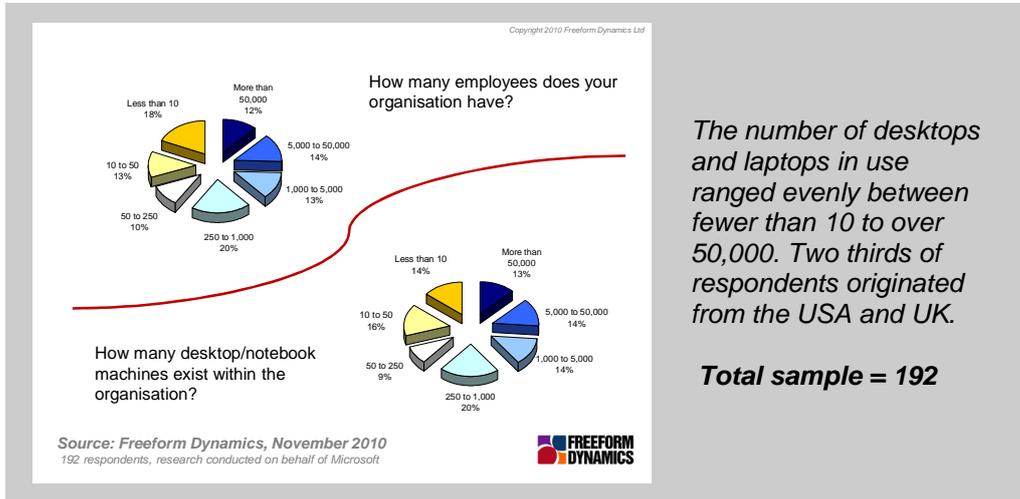
The following documents referred to in this report are available for free download from the Freeform Dynamics website:

- 1 **Desktop Virtualisation**
Early days for mainstream adoption
<http://www.freeformdynamics.com/fullarticle.asp?aid=790>
- 2 **The Great Virtualisation Debate**
Practitioner insights into the where, why and how
<http://www.freeformdynamics.com/fullarticle.asp?aid=139>
- 3 **Desktop Modernisation**
A service delivery view
<http://www.freeformdynamics.com/fullarticle.asp?aid=848>
- 4 **Evolution of Desktop Service Delivery**
Aligning client computing and virtualisation technologies with business needs
<http://www.freeformdynamics.com/smartguide/desktop-evolution>

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:



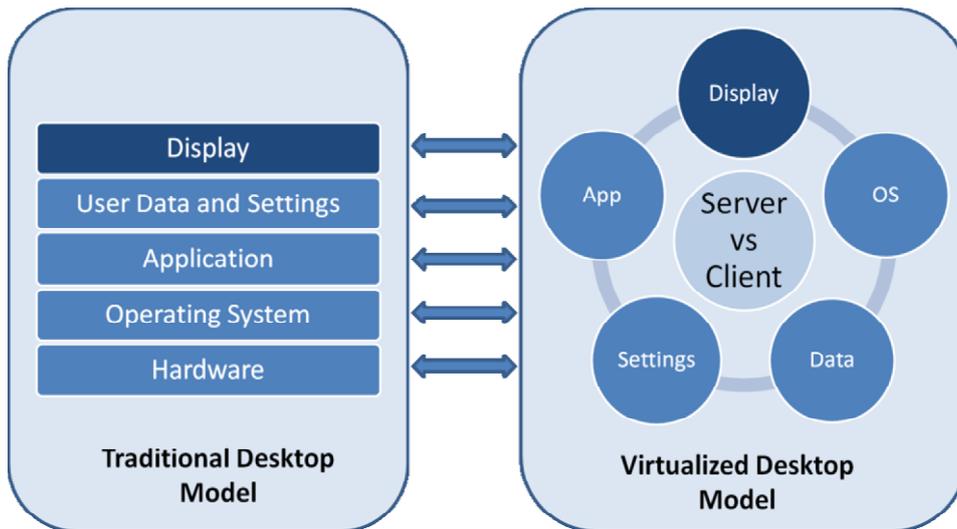
Note that the usual caveats to do with online research apply to this study, namely that respondent profiles are self declared and the 'self-selection' sampling process is likely to have skewed the sample towards those with an interest in or knowledge of x86 server virtualisation. Neither of these factors,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

Appendix B

Overview of Desktop Virtualisation Types

What solution fits which problem?

While the display will always run on the desktop client (otherwise it would be quite hard for users to see what they are doing!), you have a choice about whether the operating system and applications run on the desktop or the server, and indeed, where you store user information in terms of both application data and configuration settings.



Desktop virtualisation breaks traditional bindings between layers

The options that emerge from this 'simple' starting point are numerous, and each option will have different benefits. Many will be familiar with session virtualisation (sometimes also known as Terminal Services or the thin-client architecture). Other, more recent variants which you may have come across include user state virtualisation, application streaming, operating system virtualisation and virtual desktop infrastructure. Without dwelling on the whys and wherefores, let's have a look in more detail.

Session virtualisation, also known as Terminal Services

The term 'thin client architecture' was popularised by Citrix in the 1990s to refer to a specific computer configuration, in which multiple desktop clients log onto a single instance of an operating system running on a single server. Session Virtualisation is an extension of this approach whereby all applications or the entire desktop runs on a central server, with only the display graphics transmitted to the desktop client. In this model, the client can be 'thin' given that it only has to be able to display graphics. Indeed, the client may not need any processing power at all: 'ultra-thin clients' contain little more than a network port and a graphics card.

Virtual Desktop Infrastructure based on a shared server (VDI)

VDI can be seen as an alternative model based on the thin client idea. In this case however, as well as using one server to service the processing needs of individual users, each user has their own operating system running on a server, running as a virtual machine. VDI is often what is meant when people use the term 'desktop virtualisation' in a general way. But, as you can see, there are many other alternatives.

Virtual Desktop Infrastructure based on a dedicated blade per desktop

'Blades' are standardised server computers, designed to slide into a specially designed rack (like books on a bookshelf) to minimise space and power requirements. Like session virtualisation or VDI, the blade-based virtualisation model allows the processing to be done on a server and the display to be transmitted to the user's desktop. In this case however, each blade runs a single operating system and is allocated to an individual user at runtime.

Application virtualisation, through streaming

Traditionally, applications have been tied to the desktop operating system and require installation on the desktop/client, where they share resources like run-time libraries and configuration settings. In the application virtualisation model, individual applications are bundled up with the resources they need to run. Applications are not installed directly on the client computer, removing potential conflicts with other applications and minimising the impact on the operating system. This approach can also be combined with session virtualisation or VDI solutions to provide an extension of service delivery capabilities.

Client partitioning (e.g. multiple virtual machines on the same desktop)

For completeness, we need to give a mention to single-instance desktop virtualisation, where virtualisation software is run on a desktop computer. The model was popularised by IT pre-sales engineers who could 'run up' a version of their software in a virtual machine, meaning they didn't have to carry around a separate demonstration computer. Importantly, single-instance desktop virtualisation does not require a network connection as the virtualisation software runs on the same device as the desktop itself. These days, single-desktop virtualisation is also incorporated into Windows 7 in the guise of 'XP Mode', or MED-V for larger companies needing to manage such environments, enabling legacy Windows XP applications; it is also a popular mechanism for running Microsoft Windows on the Apple Macintosh. These capabilities are well suited to allow old applications to run under Windows 7 making them useful in certain migration scenarios, especially where applications dependent on Internet Explorer 6 cannot operate on the new systems.

It should be noted that some organisations, and solution vendors, also describe "**User state virtualisation**". In some scenarios a simple yet valid option is to 'virtualise' the linkage between a user's configuration settings and/or data, storing this information on a server such that a user session can be accessed from any connected desktop client. It works well in tandem with standardised desktop environments, where each desktop is running a similar set of applications. From the user perspective, not only can users log on where they want, but also, should something go wrong with the desktop, work can continue on another machine with minimal interruption.

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

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