The Great Virtualization Debate

Practitioner insights into the where, why and how

Tony Lock, Freeform Dynamics, January 2008

With virtualization close to the top of every CIO's to do list, we undertook the task of finding out how well server, storage and desktop virtualization is currently understood and where it is being applied, discovering what is driving adoption and, just as interestingly, what is holding it back.

KEY POINTS

The 'why?' of virtualization is fully accepted; now it's about the 'where?' and the 'how?'
When views on the role of virtualization were gathered during a recent online survey of around 1,500 IT professionals, it was clear that virtualized infrastructures were generally accepted as a fundamental component of the modern IT landscape. This confirms that virtualization is not only 'fashionable', but that the potential to deliver tangible value is widely appreciated. It is time, therefore, for IT vendors, consultants, analysts and, indeed, those in mainstream IT departments, to move conversations on from the high level rationale to specific practicalities.

The center of gravity for mainstream activity is virtualization of x86 platforms
While virtualization in proprietary platform environments is nothing new, and all areas of IT infrastructure are ultimately a target for the virtualization approach, the center of gravity for activity today is currently around x86 servers. With almost 90% of large organizations participating in this study doing something in this area, and over half indicating use of virtualized x86 platforms for business critical applications, there is no doubt at all that this type of solution is now mainstream. Concerns about robustness and fitness for purpose are now becoming a thing of the past.

Storage virtualization remains a specialist domain, which may be limiting adoption
The broader IT professional community is much less familiar with virtualization in the context of storage. This understandable in larger organizations where storage architecture and management is generally considered a specialist discipline. Perceived complexity, however, could be limiting uptake in smaller environments where more generalist skill sets predominate.

While interest is there, desktop virtualization adoption is currently behind the curve
The theoretical benefits of desktop virtualization in terms of better use of hardware and improved manageability appear to be appreciated in an abstract sense, but few organizations have translated this sentiment into specific business cases, plans or activity. The prospect of another wave of Microsoft desktop upgrades in the coming year or two may be the prompt that changes this.

Suppliers have an important role to play in smoothing the path going forward
While enthusiasm for virtualization is high, there are several areas in which IT professionals want to see change. Chief amongst these is a desire for software licensing models to better reflect the inherent flexibility of virtualized environments. Another common request is for application and middleware vendors to formally support virtualized deployments of their solutions, which is not always the case today. While we wait for vendors to overcome their inertia, it is still a case of *caveat emptor*. This will change over time, but we advise for now that virtualization friendliness is added as standard to the list of software selection criteria when making purchase decisions.

During the research upon which this report is based, feedback was gathered from 1459 IT professionals representing a broad cross section of differently sized organizations in the UK, USA and the rest of the world. While the study was funded (indirectly) by VMware as part of an online debate series run by The Register news and analysis site (www.theregister.com), all work was carried out in accordance with the independent spirit of community research, with Freeform Dynamics remaining in control of study design, execution, analysis, interpretation and reporting.

Foundation for this report

This report provides a snapshot of activity with regard to the adoption of virtualization solutions in business today, including review of general awareness of such solutions and the perceived business drivers for their adoption. Along the way, we consider the various areas of IT in which virtualization solutions are being deployed, from servers, through storage to personal computing on desktop or notebook PCs, along with some observations on software licensing.

> ***Caveat:*** *Percentages on the charts presented in this report relate to the study sample. When reviewing these, it should be noted that the self selecting nature of online research means those with an interest in or knowledge of the topic are likely to be proportionally overrepresented. This is immaterial to the discussion in this report, but can be misleading if results are taken out of context.*

Overall sentiment and knowledge

There is widespread enthusiasm amongst IT professionals for virtualization. Indeed, this modern and flexible approach to implementing IT infrastructure appears to instill a 'feel good factor' for the majority of IT practitioners, regardless of the size of organization they work within (Figure 1).

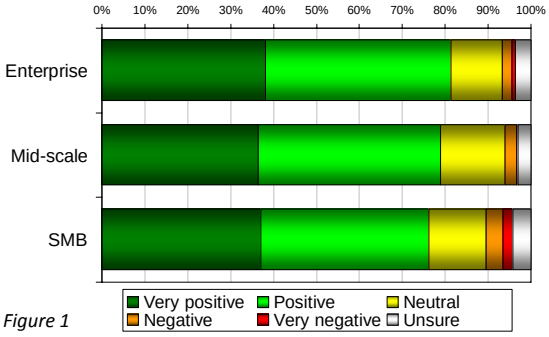


Figure 1

Overall, respondents feel good about virtualization solutions.

Hand in hand with the overall positive response to virtualization is the observation that participants in this study are content with their level of understanding of the solutions available today, indeed the majority of respondents had a significant amount of practical experience (Figure 2).

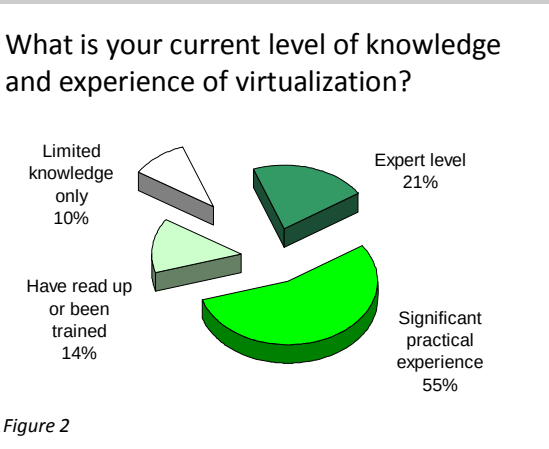


Figure 2

Significant workplace experience using virtualization tools is available. This picture varies a little by organization size, but not by much.

This kind of audience 'clued up' audience is well placed to comment on the rationale for adoption of specific types of solution in a more tangible sense.

Perceived strength of the case for adoption

Turning to the rationale for adoption in more tangible sense, there is significant variation in the perceived strength of the case for virtualization across the different solution categories (Figure 3).

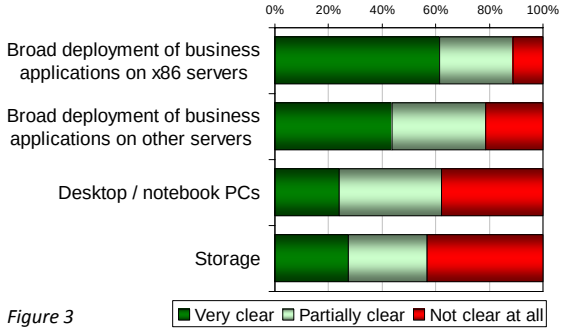


Figure 3

Server virtualization is now widely accepted for live systems. Utilization of virtualization in storage solutions and the desktop environment appears to be less mature.

Starting at the top, when it comes to virtualization of x86 servers there is extremely high recognition of the case for the adoption. We have not shown it on the chart above, but if you look behind the headline numbers, views in this area do not vary a great deal by organization size. Virtualization in an x86 environment is therefore considered relevant pretty much across the board.

Perceptions of the rationale for virtualization of non-x86 server platforms such as proprietary Unix boxes, traditional IBM platforms and so on, are not far behind, but the variation by organization size is bit more obvious. This reflects the general skew of traditional/proprietary platforms towards the higher end of the market, with smaller organizations less likely to appreciate the potential.

In contrast, the rationale for virtualization on desktop is significantly less clear, and the same appears to be true of storage virtualization. The latter, however, can at least partially be explained by the fact that storage architecture and management is generally considered to be a specialist discipline, whereas many of the participants in the study were likely to have had more generalist skills and experience. It is unfortunately not possible to verify this with the data available, but it is a possibility that we need to bear in mind before assuming the case for storage virtualization is weak.

From theory to practice – a look at overall adoption levels

Moving on to actual adoption, we see significant uptake in all areas of virtualization, but with particularly high use in relation to x86 platforms for both critical and other applications (Figure 4).

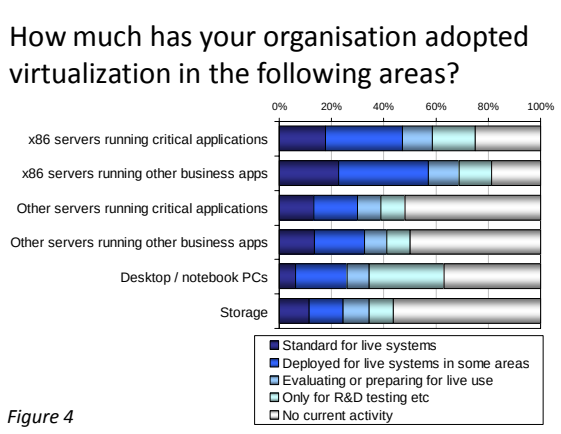


Figure 4

Server virtualization is now widely accepted for live systems.

Utilization of solutions for virtualization of storage and the desktop environment appears to be less mature.

It is no surprise that at this overall level, the picture looks similar to that we saw before in relation of strength of rationale for virtualized solutions. Organizations are therefore translating the perceived business case for adoption into actual investment and implementation activity.

The other interesting observation from this chart is that virtualization is being used almost as much for critical as non-critical applications, dispelling the myth that solutions are not yet ready to handle the 'grown up' stuff. Based on this evidence, it is safe to say that virtualization is now a genuine mainstream approach to implementing modern IT infrastructures.

Having said this, while the data behind Figure 4 shows little difference in adoption between large and mid-scale enterprises, it is fair to say that take-up in the SMB sector lags behind. A number of potential reasons could be behind this; firstly, that SMB businesses do not possess the IT resources which would need to be devoted to exploring the use and application of virtualization solutions in their organization. A second possible explanation could be that SMBs are, by their very nature, driven by day to day requirements: it is possible that many have yet to come across a new business issue or need that could be addressed by employing virtualization. Alternatively, perhaps SMBs do not consider that they are of sufficient scale to need some of the advantages of virtualization

Whatever the reason, we can speculate that as SMBs either renew their server base or seek to bring online new applications, there will be increasing deployment of virtualization solutions. In the meantime, it could be worthwhile for both SMBs and their IT partners to consider the potential benefits of virtualization beyond the obvious – for example, the consolidation of physical IT estates to improve business flexibility, disaster recovery and availability of core systems. More of this later as we drill into some of the specifics associated with the different categories of virtualized solutions.

Server virtualization in more detail

Concerning the drivers to adoption of server based virtualization, it appears there are a lot of forces at play (Figure 5).

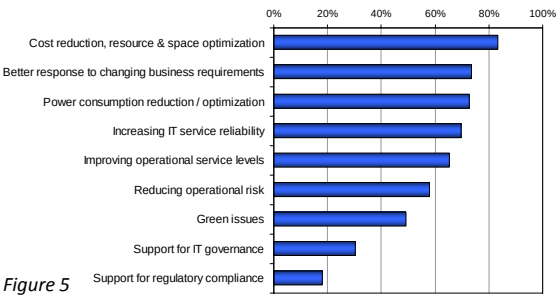


Figure 5

Server virtualization is now widely accepted for live systems.

Utilization of solutions for virtualization of storage and the desktop environment appears to be less mature.

The chart here relates to x86 platforms, but the ranking of drivers for other server environments is very similar. The sheer breadth and level of the drivers we see explains why adoption is following so closely the recognition of the value such facilities can deliver.

Looking at some specific drivers, "internal cost reduction, resource and space optimization'' is the most frequent occurring. This is entirely understandable given the impetus towards maximising the efficiency of data centres and computer rooms, and otherwise doing more with less that is common in organizations of all sizes and complexity.

The relatively new factor of reducing/optimizing power consumption highlights how both IT and energy costs are far more visible in enterprises than ever before (indeed, for some data centers there are difficulties in getting additional energy supplies into the facility at all, never mind handling the associated cooling issues). While this particular constraint is going to be data center specific, it

is clear that it is a challenge for many organizations. For example, in California where power caps exist, and major cities such as London, New York, Frankfurt where space is limited and expensive, and energy supplies are constrained, power and space optimization are significant pressures.

Other traditional features of IT operations ranking highly include “increasing service reliability”, “improving operational service levels” and “reducing operational risk” – all well understood technology drivers for modern IT.

The one significant driver we haven’t mentioned yet is “improving response to changing business requirements”, which ranked second and recognized by over two in three organizations, perhaps indicating that we are moving into a ‘second phase’ of virtualization projects that look beyond the traditional IT operations remit and into business service alignment and flexible IT resource consumption.

Drill down on storage

It is strange to report that when it came to considering the clarity of the rationale for virtualizing storage, perhaps the area with the most mature of virtualization technologies if we ignore the mainframe, the levels of understanding, whilst high by most standards, were lower than those for the relative newcomer, server virtualization. The data indicates that between 70 percent (large enterprise) and 50 percent (SMBs) stated that they were either very or partially clear on the rationale for the adoption of storage virtualization. That said, another way of considering these numbers is that storage virtualization is still considered to be an area for specialists, whereas the sample that participated in this study was made up of a broad cross section of IT professionals, including those with a more generalist skill-set.

Regardless, when it comes to real world usage of storage virtualization solutions, fewer than a third of respondents in large or mid-tier organizations have made it a standard for live systems generally or utilized it for live systems in some areas. The SMB sector exhibits even lower adoption rates of not much more than ten percent, a result that perhaps mirrors the scarcer availability of specialist skills in this area, as well as a much lower level of perceived need for specific storage technologies (virtualized or not) in the SMB space. It could also be the case that vendors have not managed to communicate the value of these solutions to smaller organizations, or perhaps have just not managed to bring them effectively to this fragmented market.

When we look at the factors encouraging adoption of storage based virtualization, the strength of the drivers is significantly lower than for server based solutions, even if we home in on the subset of respondents with some experience (Figure 6).

Which of the following do you regard as significant drivers for broad adoption of storage virtualization? *(Current Adopters)*

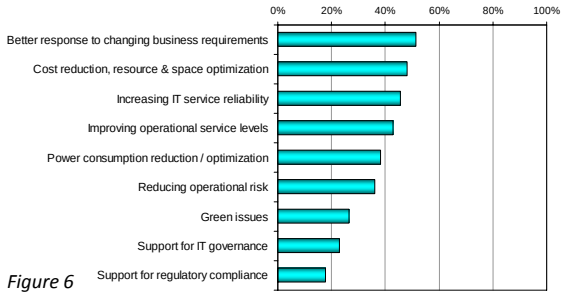


Figure 6

The arguments for storage virtualization are less well developed or understood.

As we can see, with some slight changes in the ranking, the picture is not wildly different to the server virtualization drivers we saw previously. But why is the average strength of these drivers so much lower?

The fact that there are far fewer IT professionals who consider themselves to be storage specialists may go some way towards explaining this, i.e. even those respondents who indicated use of storage virtualization within their organization might not be close enough to the implementation to have a good view of the driving factors. Another possible explanation is that in order to appreciate the specific influences and benefits that storage virtualization could bring to an organization, there needs to be a prior understanding of the need for a dedicated or discrete storage capability in the first place, and for many organizations, that simply isn't seen as a priority, particularly among smaller organizations. Falling out of this is perhaps a call to action for the supplier community to make discrete virtualised storage solutions more 'consumable'.

The elusive case for desktop virtualization

It is apparent that desktop (and indeed, notebook) virtualization still has a way to go before such approaches will be adopted by a majority of organizations. As a reminder, we saw previously that in the overall sample, a large number of respondents (almost 40%) had no idea of the drivers for solutions in this area (Figure 3 above), with the level of adoption also being relatively low (Figure 4 above). In line with this, many of the freeform comments captured during the survey (free text responses to open ended questions) indicate that generating a convincing business case is still hard work when it comes to getting approval to virtualize desktops and notebooks.

The general lack of understanding of the business case for desktop virtualization, particularly in the context of higher level business and operational drivers, is underlined by the fact that even when we home in the current adopters, the perceived level of benefit is the lowest of all of virtualization solution categories (Figure 7).

Perceived drivers for desktop virtualization compared to other solution categories
(Percentages relate to adopters within each category)

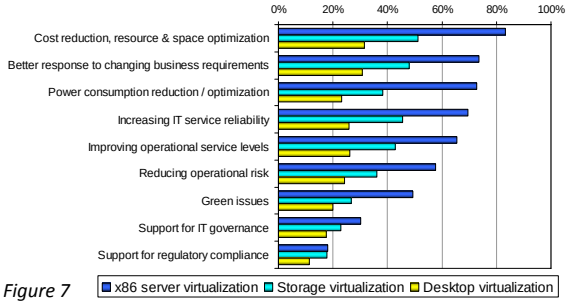


Figure 7

High level business and operational drivers for desktop virtualization still elude even those that are active.

However, there appear to be some stronger drivers that are more specific to the desktop (Figure 8).

Which of these additional benefits have you achieved or do you anticipate from desktop virtualization? *(Current Adopters)*

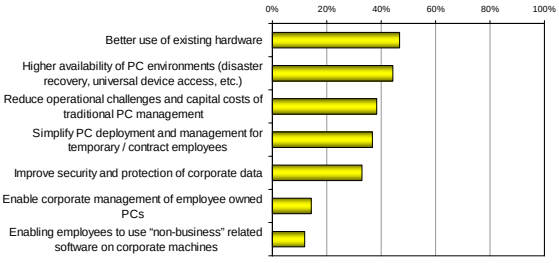


Figure 8

More practical drivers are evident though.

Organizations are thus apparently more clued up on the specific practical benefits of desktop virtualization, but haven't yet necessarily mapped these onto higher level business and operational and benefits

On a specific point, It is interesting to see that on the expected benefits side of the equation, the ability to manage either employee owned systems used to access corporate systems or to permit employees to make use of "non-business" related software are expected to be of value in a very small number of organizations. This is an interesting finding because IT vendors have expended considerable efforts in developing and promoting these specific benefits, and yet we see that few organizations currently consider them as being viable reasons to consider desktop and notebook virtualization. There is arguably a big missed opportunity here as the fact that it is possible to safely and easily partition 'work' and 'play' on the same hardware by employing virtualization could be of significant value to organisations which promote home working or who have significant numbers of offsite, home or contract workers.

It will be interesting to see whether or not continued exposure to this type of messaging will change the perception of the organisations that don't currently see the value, as this is certainly an area of intense vendor activity. Ultimately though, organisations will set the pace as to the degree of value they place on being able to properly deploy, manage and safeguard corporate equipment, software and information, and this could be as much a factor of hardware refresh cycles as the growth of offsite or remote working.

When it comes to challenges or barriers to the adoption of desktop virtualization, the small matter of "determining where desktop virtualization is appropriate" is ranked as the biggest issue, closely followed by "unclear business case", "other more pressing priorities" and "lack of familiarity with the technology" – which speaks volumes in terms of summarizing the position. Yet another call to action to the vendor community to increase awareness and accessibility of solutions.

A final observation on software licensing

Software licensing has always been a somewhat frustrating and troublesome area for IT managers, and the advent of virtualization has not only exacerbated the general problems, but has also been the cause of considerable additional confusion amongst IT professionals. Indeed, less than 30 percent of those who had enough knowledge and experience with the commercial side of virtualization to provide us with a definite response were completely happy with the way licensing works today in any software category (Figure 9).

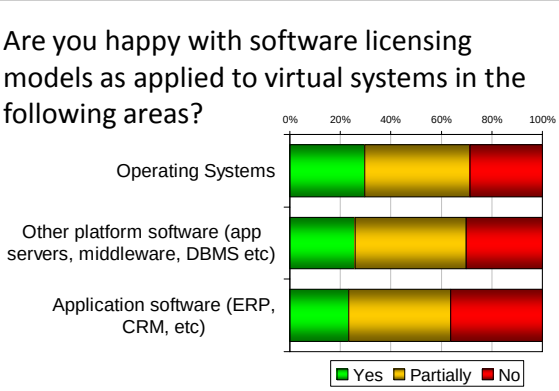


Figure 9 *(Percentages relate to those able to answer)*

License model satisfaction varies little when considering organization scale, although smaller businesses are, perhaps somewhat surprisingly, generally slightly happier than larger enterprises.

Looking behind this picture, it is evident that licensing matters are not solely focused around cost. Issues raised within freeform feedback also include the complexity of license management, inflexibility of licensing models, and lack of formal support for virtual environments.

On this last point, it is not just the commercial and compliance question of whether or not licensing terms permit software to be run legally on a virtual machine, there is also the practical issue of

whether the vendor will provide support for this mode of operation. Comments relating to support staff requiring problems to be reproduced in a non-virtualized environment before help is forthcoming were frequent.

Back to the core question of cost and complexity, however, many users are concerned that with partitioning on virtual machines one might end up with several application instances running on a single CPU and being faced with having to pay for each instance as if it were hosted on a real server. Equally, some are faced with having to pay for software that is currently running on a fraction of a processor, yet again having to pay as if it were operating on the whole physical box.

Confused? Well exactly, and it is not surprising that one of the most common requests we received was for “simplicity” and “clarity” of licensing, along with better license management tools and perhaps a need for some degree of industry license standardization. Beyond this, some the suggested that they would eventually like to see some form of usage based license model.

Whatever the resolution or resolutions that ultimately emerge, this study clearly tells us that the software vendor community has significant work to do in either explaining licensing models for virtual systems, or evolving them to better fit virtualization.

Conclusion

Virtualisation has clearly reached the mainstream, and indeed the nature of deployments are getting more sophisticated as time goes by. In particular server virtualization has seen strong penetration into organizations of all scales, with around half of respondents citing this as either a standard approach or one being utilized in some live systems.

However, survey respondents also identified that there remain issues to be resolved, especially around software licensing and ISV support in virtualized operations. Equally, while the business cases that support the adoption of server virtualization are well understood, it is very clear that in other areas, notably storage and desktop/laptop virtualization, IT professionals have either yet to be convinced of the reasons to adopt virtualization or indeed, that they have other priorities right now. It is ironic that desktop/laptop virtualization should be seen as less interesting given that it is here that the technology really found its beachhead; at the same time, however, outside the more obvious workloads (demonstrations, test environments, sandboxing of new software and so on) the most obvious question to arise for more general use is, “Why bother?”

This general level of disinterest in areas outside server virtualization raises an interesting set of questions, not least for companies such as VMWare, Microsoft and Citrix/XenSource, who have invested so much in the potential of virtualization. Essentially there are two schools of thought: the current, de facto approach is for virtualization to exist where it is more appropriate to run a set of applications from within a specific virtual machine, rather than directly on a real computer. Meanwhile the touted promise of virtualization does not stop there, but treats virtualization as an enabler of far greater things – virtual machines that redistribute themselves across the resource pool, for example, to yield a truly dynamic data center environment.

Achieving such objectives will require virtualization to be understood across the IT architecture. There are no generally accepted terms for this yet, but we can consider something akin to a supply chain being applied to virtual, rather than real IT resources: when virtualized applications on virtual servers can take full advantage of data pools on virtual storage, for example, it will be easier to migrate applications and/or data across the virtual environment. Such theoretical benefits need to be made tangible before people will buy into them, however. The research tells us that the application of virtualization technology outside more obvious areas such as server virtualization, will lag considerably unless organizations understand how best to apply more complex approaches to their specific requirements.

Right now there is still plenty to be done with the “obvious”: server-based virtualization is still yet to reach saturation point. However, there will come a point in the none-too-distant future when such capabilities become the norm: as we watch the rapid progress and integration into the compute platform of “hypervisor” virtualization engines, perhaps this point is closer than we think.

APPENDIX A

Study Sample

This research and discussion report is based largely on the output from an online survey independently conducted by Freeform Dynamics Ltd in October and November 2007. The survey was conducted online, gaining 1459 responses. Geographically the respondents were evenly split between the United Kingdom, the United States and a wide range of countries from the rest of the world (see figure 10).

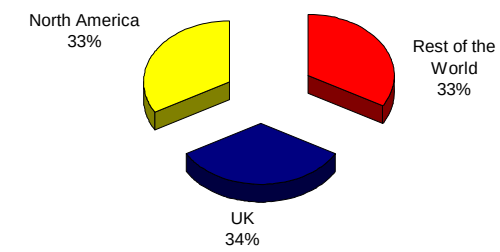
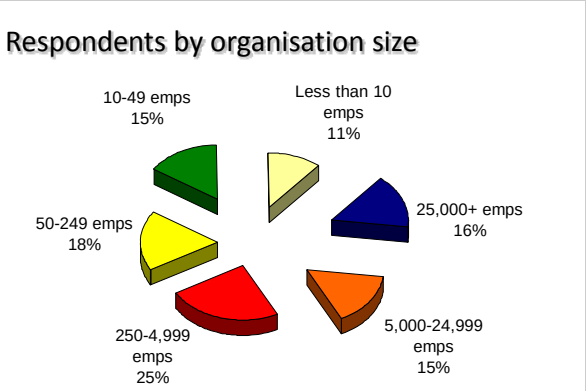


Figure 10

Regional emphasis on the USA and UK, but with a 'flavor' of the rest of the world

The split by organization size can be seen in figure 11 below.

Figure 11



All company sizes represented with the research sample.

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Freeform Dynamics is a research and analysis firm. We track and report on the business impact of developments in the IT and communications sectors.

As part of this, we use an innovative research methodology to gather feedback directly from those involved in ITC strategy, planning, procurement and implementation. Our output is therefore grounded in real-world practicality for use by mainstream IT professionals.