
Private Cloud in Context

What's it for and where does it fit?

Dale Vile, Freeform Dynamics Ltd, May 2012

The term 'private cloud' has been described by some purists as an oxymoron; if cloud computing is all about services based on public shared infrastructure, it doesn't make sense to use the word 'cloud' when you're talking about how best to run your own servers and other hardware. Yet indications are that private cloud is gaining more acceptance than public cloud among IT professionals in the mainstream. It's also pretty clear that a lot of IT vendor marketing spend has been switched from the public to the private form of cloud. So what's going on?

Key Points

The concept of private cloud is easy to understand and appreciate when properly explained

When 570 participants in a recent online survey were asked how much they understood the private cloud concept, most were already comfortable with it, and the remainder generally 'got it' after being given a clear definition. To IT professionals, the private cloud discussion is natural and comfortable.

Private cloud is more an extension of virtualisation and management than public cloud

Activity in the area of x86 virtualisation has opened minds to a more flexible approach to workload management. Private cloud builds on this through the addition of advanced platform software and management tools. These assist or automate the workload provisioning and de-provisioning process, help to orchestrate execution of workloads in a more optimised manner, and generally provide a more standardised and robust operating environment. While such capability is acknowledged to be a natural progression from basic virtualisation activity, few regard it as having anything to do with what's going on in the public cloud space.

Service delivery benefits are considered to be more important than cost reduction

While the potential to reduce cost and overhead through better resource management and the streamlining of operations is appreciated, benefits in terms of responsiveness to new and changing demands on IT are highlighted more frequently. Other aspects of service level enhancement to do with application resilience, disaster recovery, and better control over application performance monitoring and management, are also ranked highly in terms of benefits.

Application compatibility and licensing are seen as major considerations

While applications that have already been confirmed to be virtualisation friendly are likely to run fine in a private cloud environment, problems can occur with older and/or bespoke software that assumes direct access to resources. Larger applications that currently run on dedicated specialist clusters with hard wiring into proprietary runtime and management environments may also be questionable candidates for migration – at least until standards settle and vendors take steps to make their solutions private cloud compatible. In the meantime, testing and remediation are critical.

Private cloud is seen as a strategic play

In order of strategic importance, private cloud is ranked significantly above public cloud by IT professionals, though we anticipate all forms/combinations of delivery to play a role in the future.

The study upon which this report is based was designed, interpreted and reported by Freeform Dynamics, with data gathered from 570 respondents via an online survey hosted on The Register news site. The study was sponsored by Microsoft.



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Introduction

The phrase 'cloud computing' was originally coined to refer to flexible hosted services underpinned by shared IT resources and delivered by commercial service providers over the internet (or some other wide area network) on a pay per use model. Soon after it emerged, however, some technology vendors started using the term 'private cloud'. The idea was to create a flexible infrastructure in an enterprise datacentre or dedicated hosting environment to deliver 'cloud-like' capability - such as rapid resource provisioning, dynamic workload management, and even a degree of self-service – but managed and controlled by the internal IT department.

The purists initially objected to this (indeed some still do), describing 'private cloud' as an oxymoron. The whole point of cloud computing, they argued, was to get away from having to procure, install, operate, maintain and support IT equipment. Nevertheless, the private incarnation of cloud computing has gained momentum as a concept, and now most major vendors of datacentre hardware, platform software and management tools offer private cloud solutions.

Just like cloud in the wider context, though, the high level of creative marketing from the vendor community, along with simplistic and often inaccurate coverage in the press, has led to a degree of confusion and uncertainty among IT professionals in the mainstream around private cloud.

Against this background, our aim with this report is to bring some clarity to the private cloud discussion, with the help of feedback from IT and business professionals gathered during a recent online survey. Along the way, we will be reviewing what private cloud is, where it potentially fits, and some of the practicalities associated with implementing it.

Study overview

The research study upon which this report is based was conducted in April 2012. Responses were gathered via an online questionnaire hosted on a popular IT news site. As with all online surveys, the resulting sample (570 in total, see Appendix A) was skewed towards those with experience of or an interest in the topic, in this case private cloud, as a result of the 'self-selection' principle. Readers therefore need to be careful not to take the data we are presenting out of context, and in particular be aware that levels of activity or interest in our sample will be higher than in the general population. On the plus side, however, we have the luxury of working with input from a significant number of early adopters, which is great for generating insights into real world practicalities.

Back to basics: What is private cloud?

As with cloud computing in general, you need to be very careful to define your terms when writing or conversing on private cloud. As one of the participants in our study put it:

"There are a number of cloud configurations, applicable to private or public environments. Too bad the same word 'cloud' applies to very different usage models."

During the study, we therefore tried to make it as clear as we could what we meant by private cloud, beginning with a pre-amble to the online questionnaire which explicitly excluded the forms of hosting we would normally expect to be associated with cloud computing:

Preamble to study questionnaire

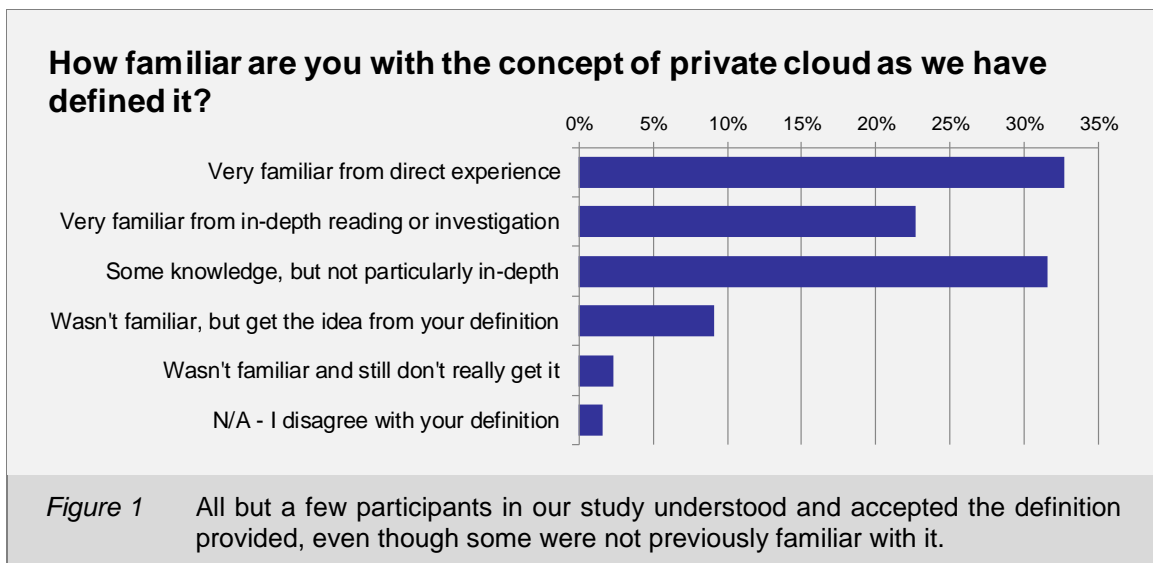
OK, to begin with, let's be clear that this survey is about architecture and infrastructure, typically in relation to kit you run in your data centre (which is what we are going to be majoring on here), but could be associated with dedicated equipment running in a hosted environment (i.e. allocated exclusively to your organisation). If you picked up on the word 'cloud' and thought we were going to be covering SaaS, PaaS, public cloud and hosted services more broadly, then you're in the wrong place.

Following this, immediately before we embarked on questions to do with private cloud specifically, we provided the following working definition:

Definition of 'Private Cloud' (as used in the research)

The basic idea of Private Cloud is to pool a bunch of servers and other resources (storage and networking) to create a general purpose platform upon which a variety of workload types can be run simultaneously. An important attribute of private cloud is the rapid allocation/de-allocation of resources to/from workloads, enabling a more dynamic approach to management.

The good news is that our participants generally understood and accepted this definition, even though some were not previously that familiar with the concept (Figure 1).



To reiterate our earlier caveat, we need to remember that respondents were self-selecting based on their interest in the topic, so the above should not be taken as an indication of the level of knowledge and understanding across the IT professional community as a whole, which we would expect to be significantly lower. Having such a well-informed sample, however, has advantages as we shall see.

Following on from the above question, we gave participants an opportunity to comment on the definition provided, whether they disagreed with it or felt that it needed adding to in some way. Around 80 of the 570 respondents provided more feedback at this point.

A small number of these echoed the purist view we mentioned at the beginning, with comments such as this one:

"If I deploy to a 'cloud', I do not care about the type and quantity of hardware, and to a lesser extent software - that is the cloud provider's problem, to provide me with a scalable environment where I do not need to know about up-scaling or down-scaling except in the bill. In a 'private cloud' as you define it I need to know about all of this."

There were then a few comments reflecting general scepticism about whether there was anything new or substantial here, e.g.

"They are just server farms, not 'clouds'."

"Can you tell me how this is different from grid computing?"

"I would class a handful of VM hosts as a 'private cloud' as this implies shared resources in a small cloud. Most importantly it satisfies the management hunger for the use of the word 'cloud'."

Most of the comments, however related to aspects of private cloud that were considered to be missing from our definition. Here is a selection to provide a flavour of these:

"Private Clouds should also have self-service portals (ops, business application owners, and developers), metering & chargeback, configuration management, provisioning automation, capacity planning & management, security & compliance, etc."

"Two other factors should also be introduced - the ability to self-serve and automated billing based on demand."

"One key feature of any cloud would be very detailed and flexible billing capability. This can be used for charge-back or show-back."

"You left out the chargeback capability as well as service virtualisation."

"The 'secret sauce' that separates a Private Cloud infrastructure from a virtualised data centre is the automation and self-service technology that allows end users to automatically provision services themselves."

The two most commonly highlighted omissions from our definition were to do with self-service and either charge back accounting or 'show back' reporting (i.e. being able to assign costs to departments, applications, services, etc based on actual resources consumed). These omissions were in fact, deliberate on our part, as we did not want to undermine acceptance of the working definition by including reference to contentious capability.

With regard to self-service, for example, we come across a lot of confusion as to what this means. In a private cloud context, we are not generally talking about giving end users within the business the ability to provision resources directly as many IT professionals would baulk at that idea (though some would argue that this is an objective, as per the last comment above). The more usual aim is to allow developers, operations staff, application administrators, etc within the IT department to self-serve without needing to create an explicit request to a server team or storage team.

With regard to charge back and show back, this is a thorny and emotive area in which many have been burned in the past. Whether you think an activity or consumption based accounting approach for IT is a good idea or not, the reality is that many organisations are simply not ready for it, so we didn't want to send the message that this was a mandatory part of implementing private cloud, even if the option is there.

Coming back to the definition, on a specific point, some spotted an element of ambiguity with regard to the concept of 'rapid allocation and de-allocation' of resources:

"All depends on what you consider rapid allocation / de-allocation."

"We don't see 'rapid allocation/de-allocation of resources' as an important feature of our private cloud."

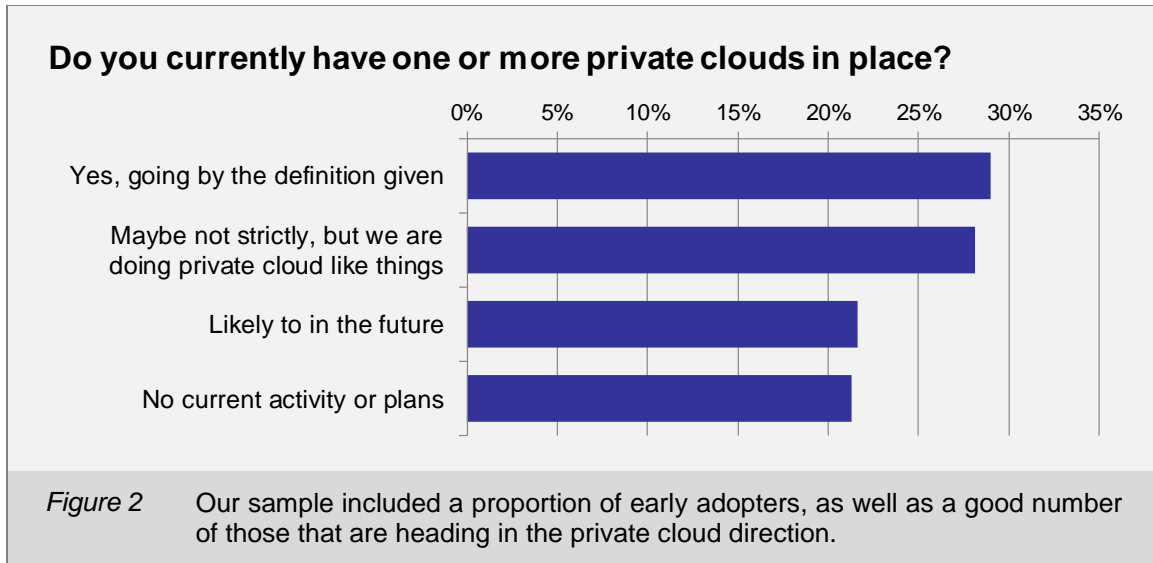
To clear up this particular point, while some private cloud solutions provide a lot of automation in this area, 'rapid' in the context of our definition doesn't mean instantaneous or anything close to that. The concept is one of moving resources between workloads (or vice versa) in more of a 'point and click' manner without having to go through though the traditional lengthy and error prone manual provisioning process. For most, this is likely to be an important precursor to full automation.

With this in mind, what did we learn from the research about private cloud adoption?

Private cloud adoption

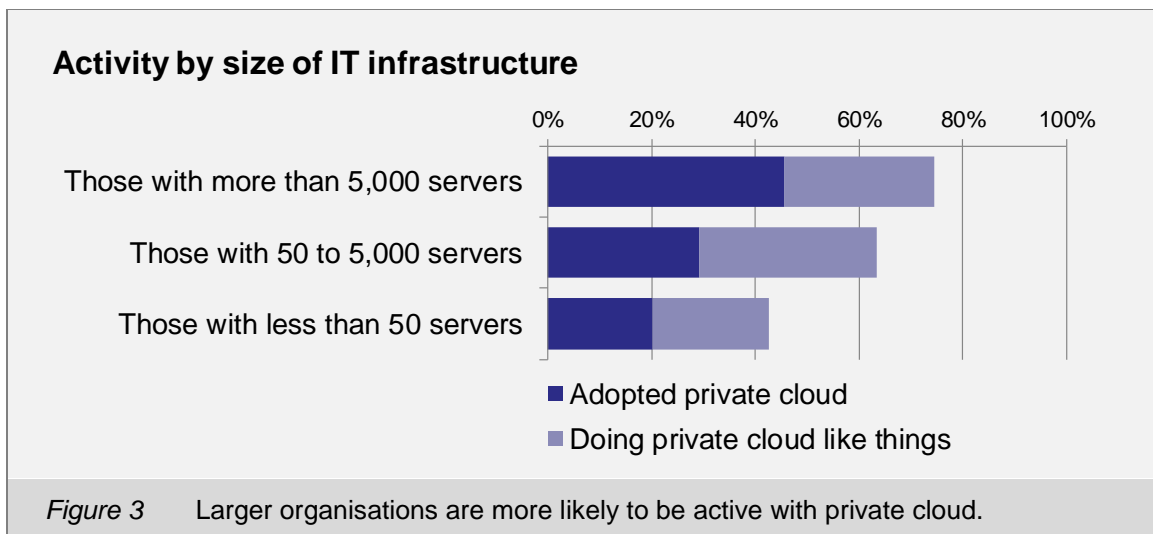
Despite the debate over definitions, it is important to keep sight of the core objective of private cloud, which is to create a more flexible and responsive environment based on pooled resources. With this in mind, we should not dismiss implementations that take traditional virtualisation to the next level through more comprehensive management tools, even if the end result might not necessarily be a private cloud in the strictest sense. Indeed, it could be argued that adopting the 'spirit' of flexible resource pooling gets you a long way towards dynamic workload management, however you are doing things.

During the study, we were keen to capture views from participants with all levels of experience, and looking at the breakdown of activity by adoption and intention confirms we achieved this (Figure 2).



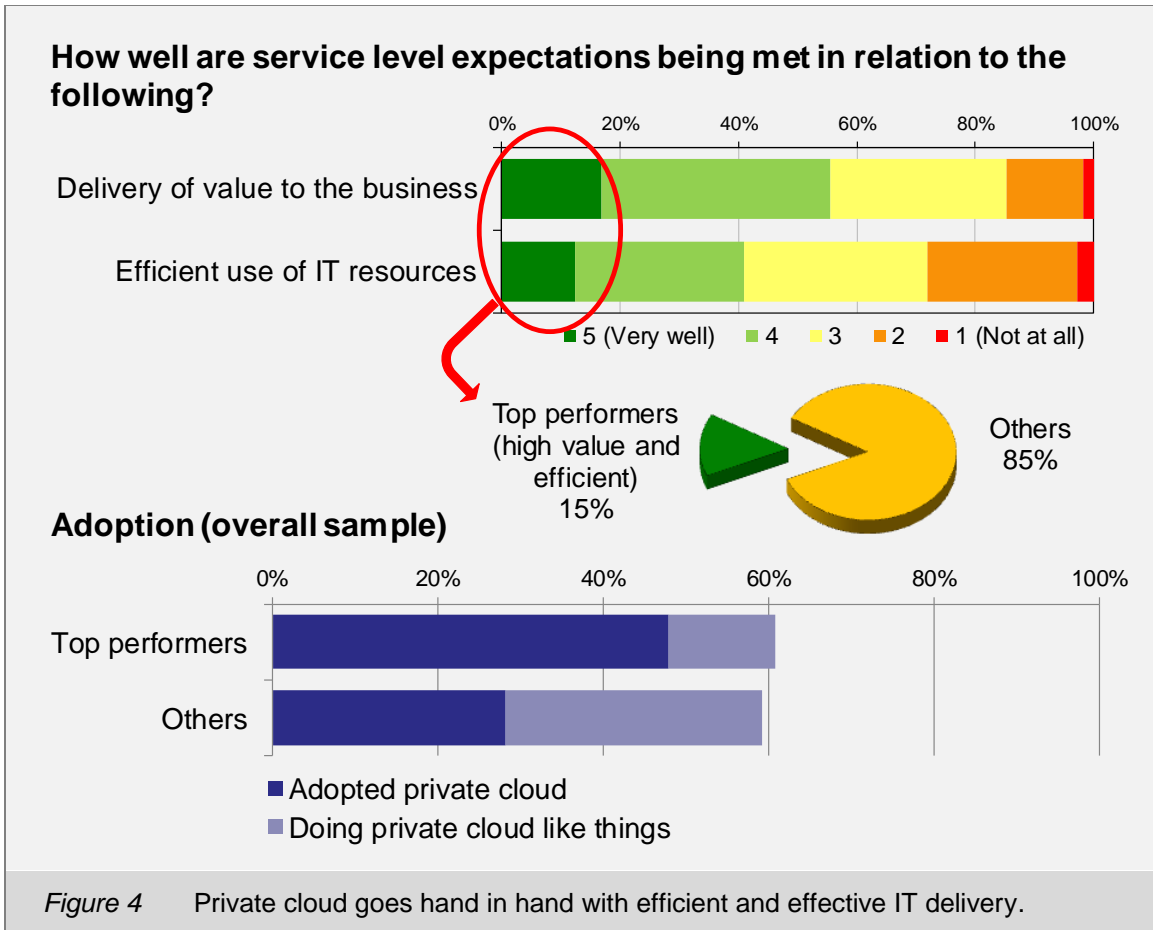
Again, we need to stress the sample skew and caution against taking the data presented on this chart out of context.

Not surprisingly, those with larger IT infrastructures, and therefore probably a more complex application and workload management challenge, were more likely to be adopting private cloud or doing private cloud like things (Figure 3).

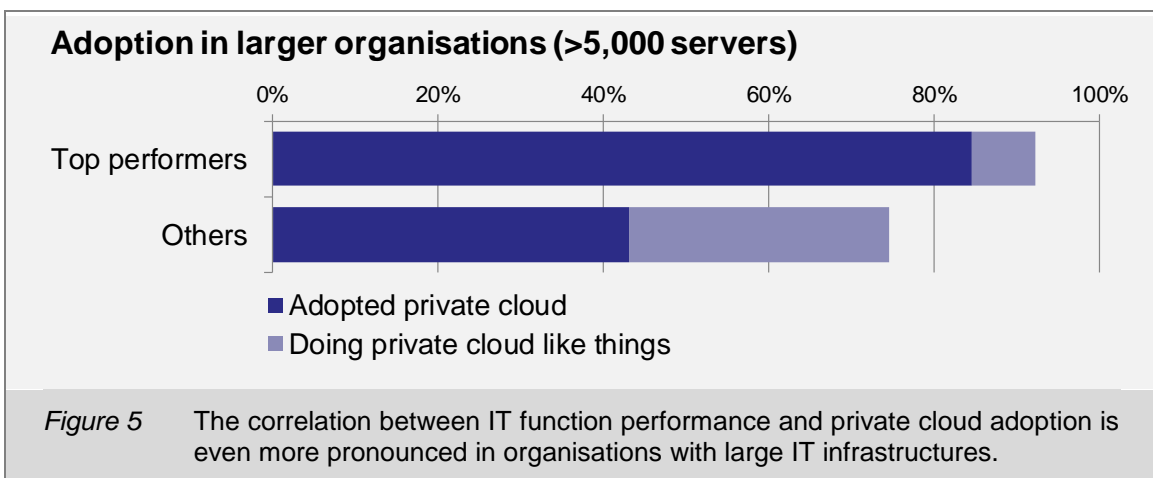


The significant number of adopters from those with smaller infrastructures, however, confirms that while the big guys might have more of an immediate need, private cloud is not exclusively for them. Indeed, we anticipate adoption at the lower end of the market to increase over time as emerging pre-integrated solutions ('private cloud in a rack') become more widely available.

Another notable difference in adoption was observed when we segmented participants based on how well their IT function was performing in terms of efficiency and effectiveness (Figure 4).



This alignment of private cloud adoption with overall IT performance was even more pronounced among organisations with larger server estates (Figure 5).



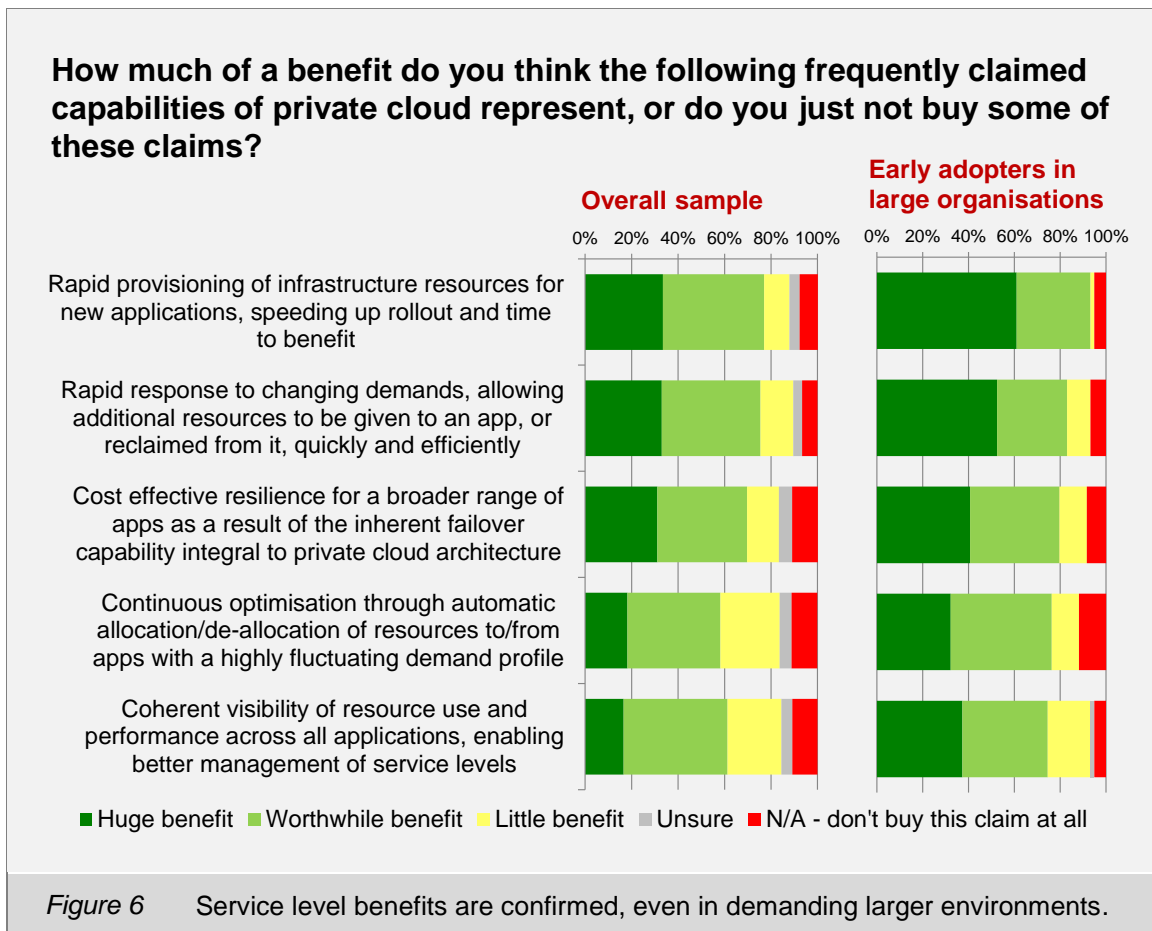
Of course we cannot reliably infer cause and effect here. It would be inappropriate to view this data as proof, for example, that private cloud enhances performance, especially as even within the early adopter community, use will still be at relatively modest levels. It's probably fair to say, however, that private cloud would appear to go hand in hand with optimised IT delivery, and that those with more of an eye on IT department performance are often appreciating the potential here before others. This brings us neatly onto our next discussion point.

Private cloud benefits and rationale

Largely speaking, we can break the benefits often claimed for private cloud into two categories – service level enhancement and minimisation of cost and overhead.

Service level related benefits

So many aspects of business today are reliant on technology, which means the level of service delivered by systems in terms of performance, availability and recovery has a direct impact on how well the organisation operates. The ability of private cloud to help with this was clearly acknowledged, but with IT often being on the critical path for implementing business change, we see benefits of responsiveness to change being particularly emphasised (Figure 6).



You'll note from this chart that benefits are particularly acknowledged among early adopters operating larger IT infrastructures (>5,000 servers). The views of this group have been pulled out, as feedback from those working in a more complex, larger scale environment provides a useful indicator of the potential of private cloud to deal with a wide diversity of needs and scenarios.

Some of the other benefits highlighted by participants underlined the importance of responsiveness and the ability of private cloud to help when it comes to solution development and rollout:

“The current business requirement is for 'agility'. No point in having agile development and then waiting for people to buy new hardware”.

“Environment parity between production, test and development at a reasonable cost”

“Fast multi-tenant provisioning of core services is useful for large organisations with many organisational units sharing common systems that are currently siloed.”

From a service level perspective, benefits to do with application availability and recovery were also mentioned by a number of more experienced respondents:

“Private cloud enables HA in applications that do not have it natively.”

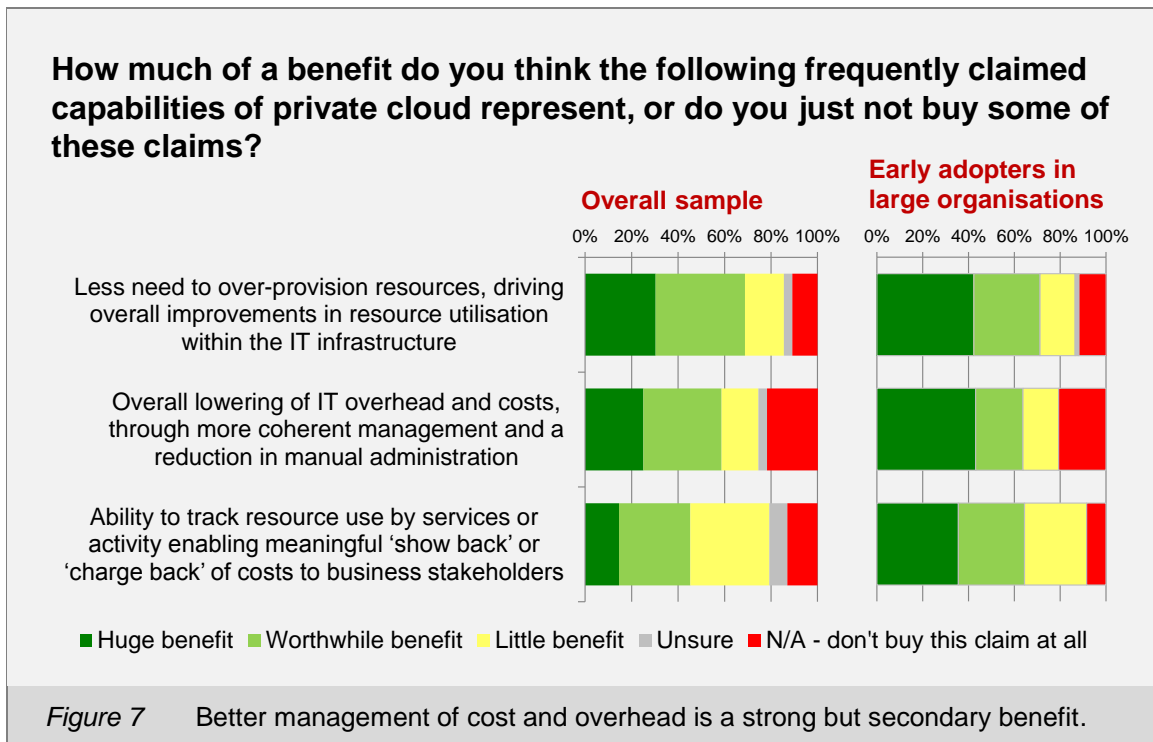
“Easier, quicker, and more reliable DR capabilities.”

And we particularly liked this comment on service level benefits, which pretty much sums it up:

“SLA, SLA, SLA”

Minimisation of cost and overhead

Many highlight the potential for private cloud to reduce costs and overhead by optimising the way resources are used and managed. However, the perceived level of benefit here, while significant, is noticeably lower than that seen above in relation to the enhancement of responsiveness (Figure 7).



Again, we see the advantages particularly confirmed by the early adopter group working in larger environments, with respondents embellishing their responses with freeform comments:

“Private cloud allows the ability to under- or over-provision at deployment and dynamically re-provision upon demand.”

“Ability to take advantage of smaller, lower power blocks of compute and stack them rather than drop more money on larger blocks of compute with higher-energy consumption.”

“Simplified, more predictable cost model.”

Other benefits

In addition to the impact on service levels and operational efficiency, some of the comments that came back in our study highlighted other potential advantages stemming from a more standardised operating environment that is a natural outcome of implementing private cloud:

“Better compliance and change management tracking due to the templated nature almost inherent in VM image rollout.”

“Security and compliance benefits of having one standard operating environment.”

“Consistent security better able to be applied and managed.”

“Information security, access control, and logging and monitoring.”

We then have the impact on the IT organisation itself and the way it interacts with the business:

“For us it finally brings all hardware maintenance and management under one team, rather than having three or four separate teams managing their own kit.”

“Driver of cultural change; weans certain departments off status quo way of working.”

Of course these last couple of points might be good in the longer term, but they are likely to bring with them a degree of short term disruption and even conflict, which raises the general question of how private cloud fits into an already functioning and often complex business and IT landscape.

Where does private cloud fit?

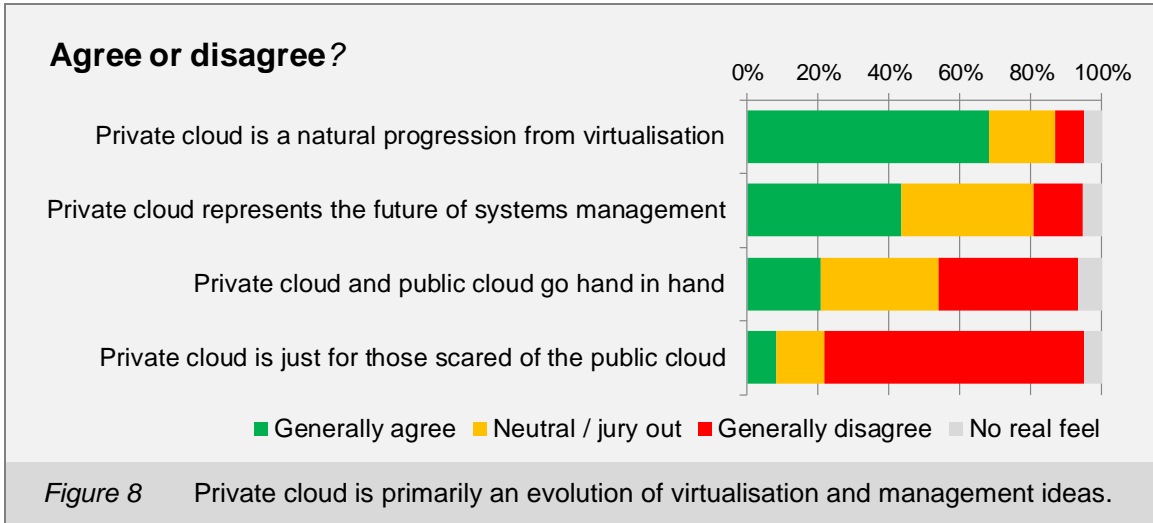
Views on the roots of private cloud and where it fits in the general scheme of things vary widely. The term itself reflects the fact that many consider it to have its origins in the public cloud computing world, with private cloud coming about as a way of bringing a more flexible, on-demand approach to computing into the datacentre – i.e. mimicking service provider capability.

The reality, however, is that all of the ideas underpinning private cloud around automated or assisted provisioning, dynamic workload management, holistic systems administration, and so on, were part of the datacentre evolution story long before the term ‘cloud computing’ was coined and ‘as a service’ hosting models emerged in the mainstream.

Indeed industry analysts like ourselves have been taking briefings from vendors on developments now associated with private cloud for the best part of a decade. And, of course, those who have been involved with mainframe technology for three decades or more frequently remind us that few of the ideas and capabilities are new per se.

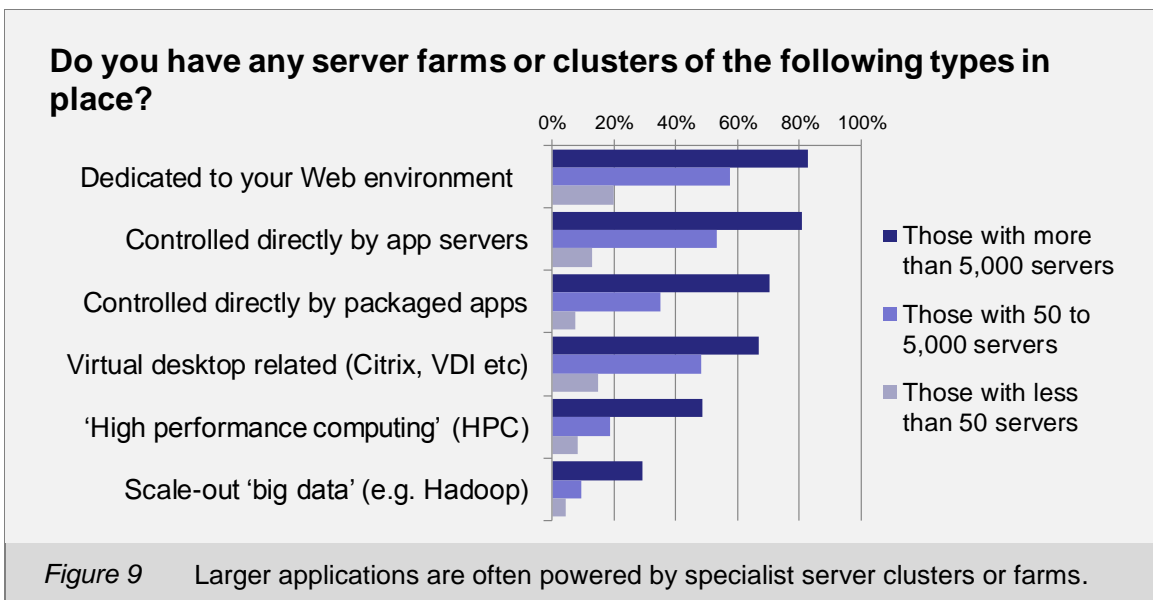
The big development in the industry that has given these ideas broader relevance and acceptance is the trend towards x86 server virtualisation. Initially used to tackle Windows and Linux server sprawl through consolidation initiatives, many IT professionals have come to realise the advantages of being able to move workloads between servers much more easily than before. Having understood and appreciated the benefits through doing this manually, or with the help of basic administration tools, the notion of using advanced management and orchestration software to introduce more control, automation and monitoring capability (which is basically what private cloud boils down to) becomes much more meaningful.

This hypothesis that private cloud is more an evolution of virtualisation and management related ideas than what's going on in the world of hosting was borne out by the views of the participants in our study (Figure 8).



You may be wondering whether the sample skew mentioned earlier has distorted this picture. While this may have accentuated the gradient of the curve we see (looking from top to bottom on the chart), the general sentiment is consistent with previous studies, even those we would expect to be biased towards public cloud adopters and advocates^[1].

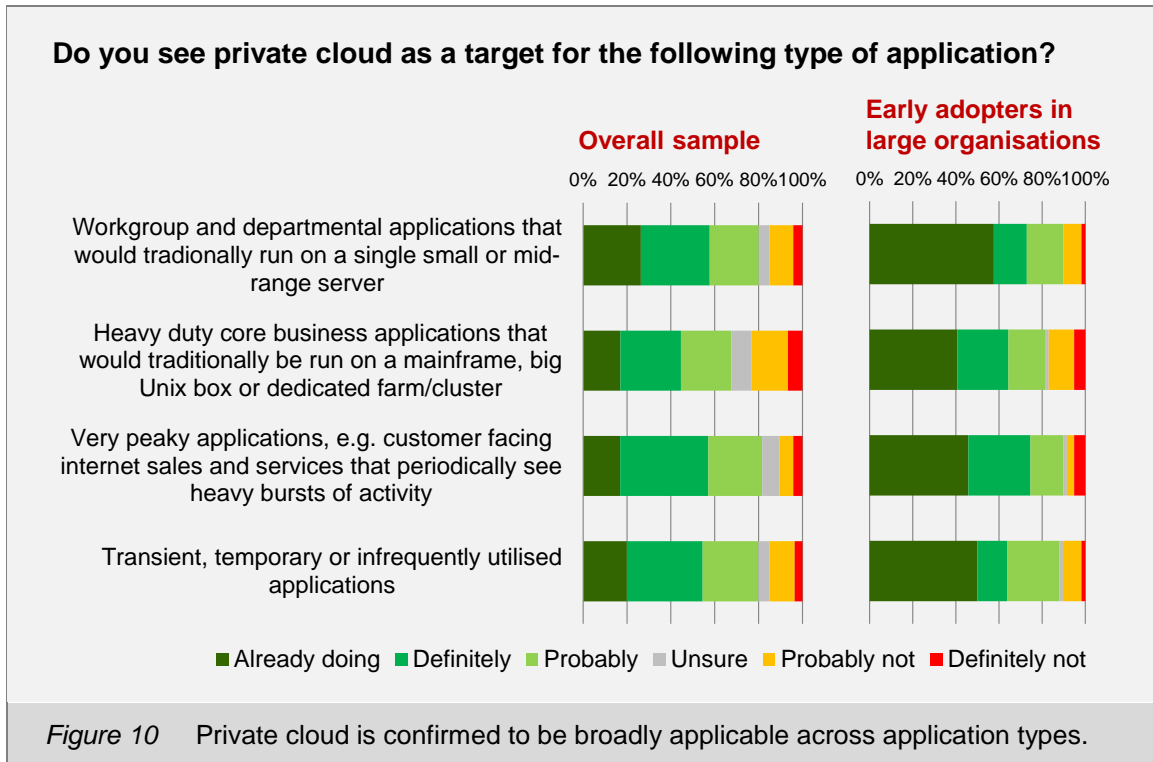
In terms of significance, the perceived link between virtualisation and private cloud does raise a question. Given that the bulk of x86 virtualisation activity today is associated with the consolidation of relatively small footprint applications to reduce the overall number of physical servers, does this mean that private cloud is only for the small stuff? What about the many applications, particularly in a larger environment, that are powered by dedicated farms or clusters of servers (Figure 9).



But what's to be gained from migrating such cluster or farm enabled applications to a private cloud environment; they are, after all, already based on a multi-server architecture. The problem, though, is that they tend to be very proprietary, using different deployment models, management approaches, platform software, and tools, and often require a unique set of specialist skills to

operate them. Migration to a more standardised private cloud environment could have benefits in terms of consistency and operational efficiency. It would also permit more flexible resource sharing across a larger pool, and a more coherent approach to service level management and administration across the organisation's application estate.

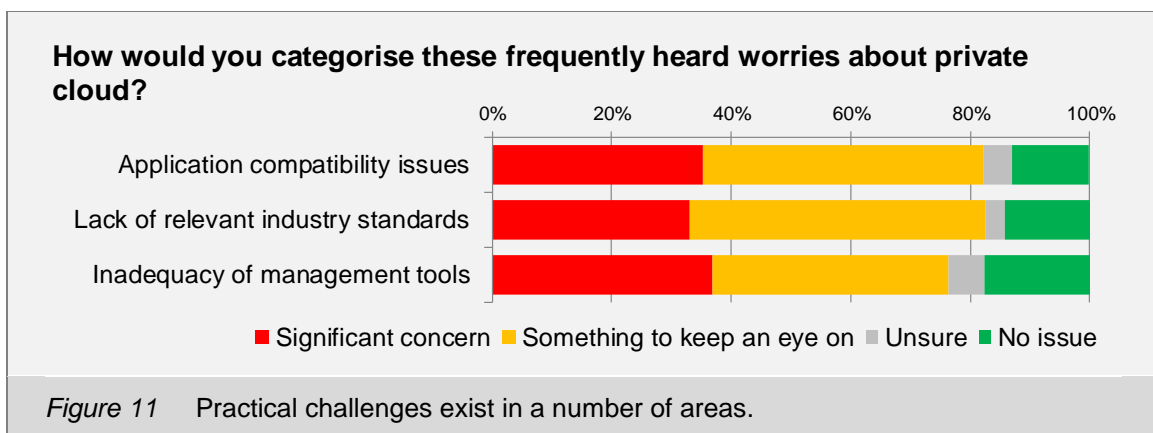
The potential here was broadly acknowledged and particularly confirmed by early adopters running larger environments, who also saw private cloud helping with very 'peaky' workloads and more transient requirements at the other end of the spectrum (Figure 10).



But we need to be careful not to get too carried away and fall into the trap of thinking of private cloud as being some kind of magic bullet. There are quite a few things that can easily trip you up.

Challenges and practicalities

The participants in our study highlighted a number of practical challenges that anyone considering a private cloud deployment needs to be aware of (Figure 11).



With regard to the compatibility of applications, while those that have already been proven to be virtualisation friendly are likely to run fine in a private cloud environment, the reality is that assumptions should not be made. Some applications, particularly older bespoke ones, still rely on direct access to the physical infrastructure, and either won't run or will run sub-optimally when deployed in a virtualised shared resource environment.

Larger multi-server applications currently running on specialist farms or clusters can also be problematic, as many of these are effectively hard-wired into proprietary runtime and management environments. Given this, the concern about lack of relevant standards that surfaced during the research is also understandable.

When it comes to application compatibility, just like any migration, the answer is clearly to do adequate qualification, testing and remedial work, and monitor performance thereafter.

With regard to concerns over management tool capability, this makes sense as tooling has been one of the fastest moving areas of development in the private cloud space, and it's only relatively recently that vendors have started to really deliver on their promises. Indeed, many of our respondents have probably been stung by unexpected gaps and constraints in the past, and difficulties getting specific cloud management tools working with the existing management environment. Wariness in this area is therefore healthy, as the success of any private cloud initiative stands or falls on the strength of the management capability that underpins it.

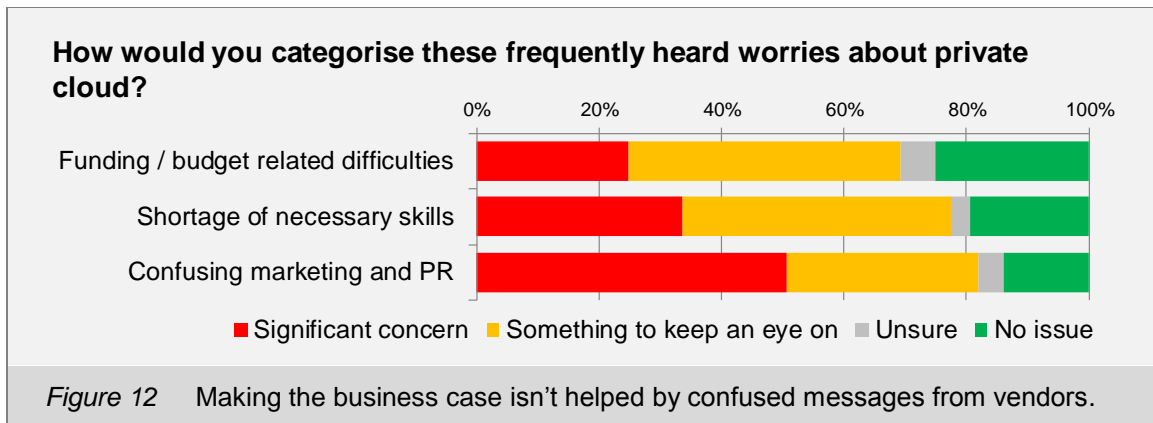
In the meantime, an issue we have discussed on numerous occasions before^[2], namely licensing difficulties in a more flexible and dynamic environment, came out strongly in this study too:

"Licensing being compatible with private clouds is key."

"Too many vendors have no idea how to license their software in a cloud environment."

"Licencing needs to be modified to be more use based and less processor/memory based."

Beyond these practicalities, a significant number of respondents were concerned about lack of funding and lack of skills necessary to implement and run a private cloud (Figure 12).



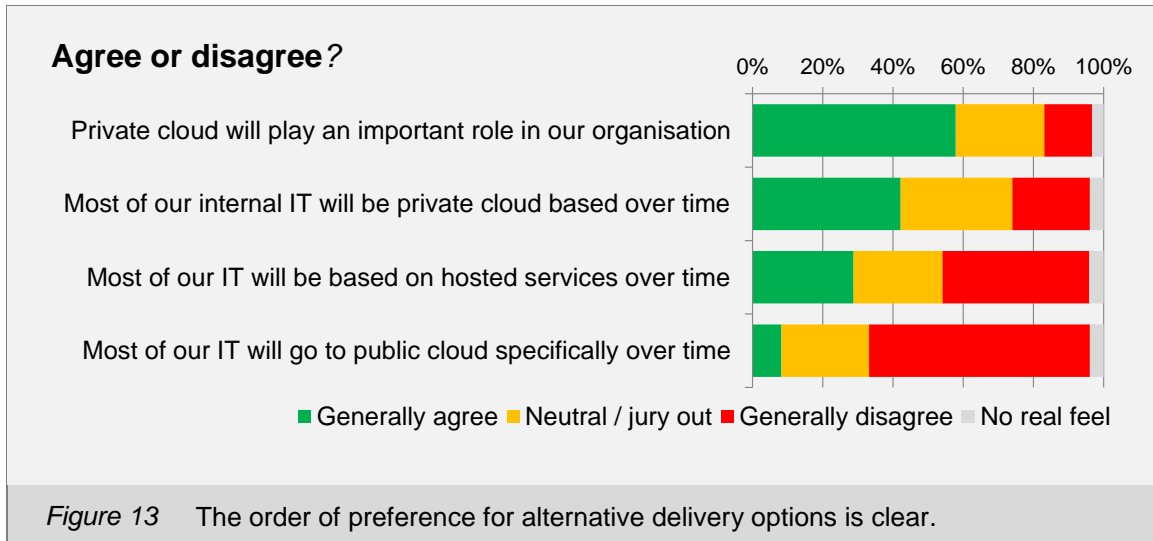
Making the business case for shared infrastructure, and the necessary training or recruitment to acquire associated skills, is notoriously hard at the best of times. With the word 'cloud' having such a high profile, yet messages from vendors and service providers often being confusing and contradictory, seeking support from senior stakeholders can be even more of an issue.

It really doesn't help having to explain to the head of finance, who thinks cloud is all about getting rid of infrastructure, that you need money to invest in new equipment, software and tools. And which budget should funding for this come out of when IT related spend has typically been aligned with individual departments and cost centres?

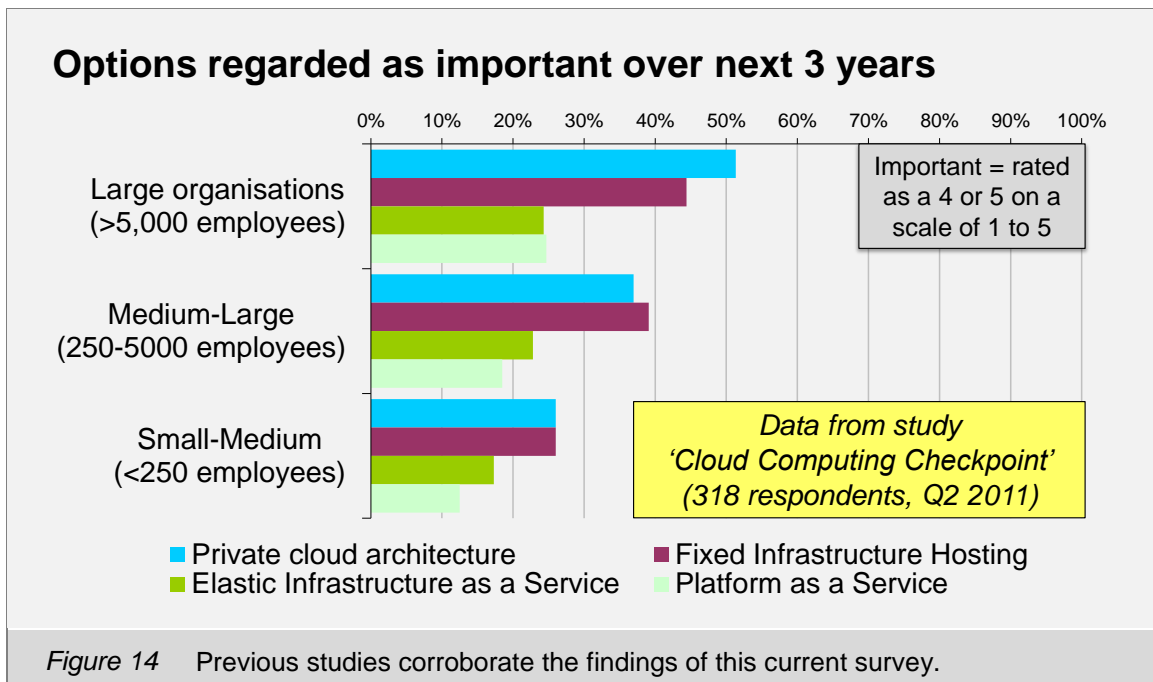
Discussion

Despite the fact that we have just been reviewing challenges and issues, the thing that struck us the most about this study as industry analysts was the overall high level of enthusiasm for the topic that came through. Although respondents were clearly realistic about the practicalities, there appears to be a growing acceptance that private cloud is likely to play an important role when it comes to the evolution of IT delivery – more so, in fact, than public cloud.

Indeed summary level thoughts from respondents in this study on the various alternatives to fixed on-premise infrastructure would tend to suggest the order of importance/preference is private cloud, traditional forms of hosting, then public cloud (Figure 13).



Of course public cloud enthusiasts are likely to be under-represented in this survey, but this is not the first time we have seen this picture. Here, for example, is a chart from a previous study majoring on public cloud^[1] that would have had a sample bias towards hosting options (Figure 14).

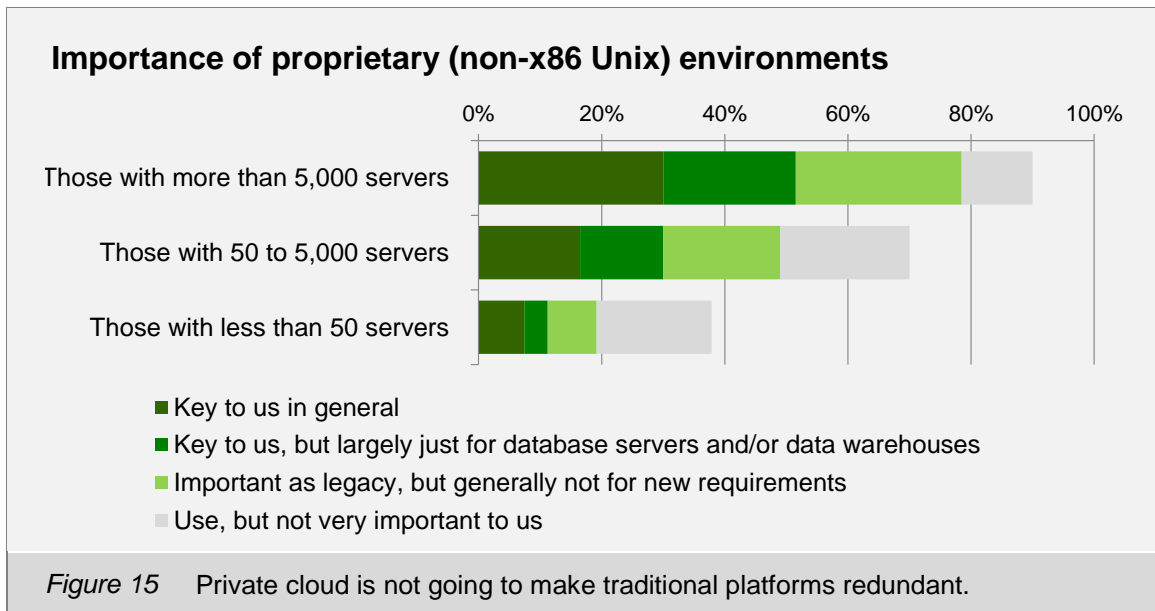


But it's not a competition between mutually exclusive delivery models. When thinking about the future of IT service delivery, it's important to consider all of the approaches we have been discussing, and the interplay between them. Private cloud architecture and traditional hosting models are natural bedfellows, for example. In fact, some of the larger service providers we have spoken with recently have been telling us that most of the large enterprise demand for cloud-like solutions is concerned with hosted private clouds based on infrastructure dedicated to the client.

Furthermore, just as x86 virtualisation activity has opened minds to private cloud, we would expect private cloud adoption to stimulate demand for public cloud services over time. Some vendors already support 'bursting' models in which a virtual workload can extend or migrate from a private cloud environment into a public one, even if only for short periods of time when demand peaks beyond the capacity of local resources.

Hybrid solutions with elements running both within and outside of the corporate firewall are further enhancing the level of deployment flexibility, allowing internal and external resources to be blended in the most optimum manner to meet specific needs. As IT professionals become more comfortable with dynamic workload management (and business stakeholders become used to the increased responsiveness), extending the concept to work across boundaries will be a natural progression.

Finally, in the spirit of thinking inclusively rather than exclusively, it's important to acknowledge that traditional types of infrastructure are still going to play a role. The majority of larger organisations, for example still regard proprietary Unix boxes as key (Figure 15).



In addition, many large organisations in particular also use mainframe technology that forms an important part of their IT delivery strategy.

But netting it all out, there can be little doubt that private cloud will be taking its place in the list of options available to IT professionals as they look to optimise their operations through the right mix of platforms, services and tools. We therefore hope this report has provided you with ideas on where private cloud architecture might fit into your IT landscape.

References

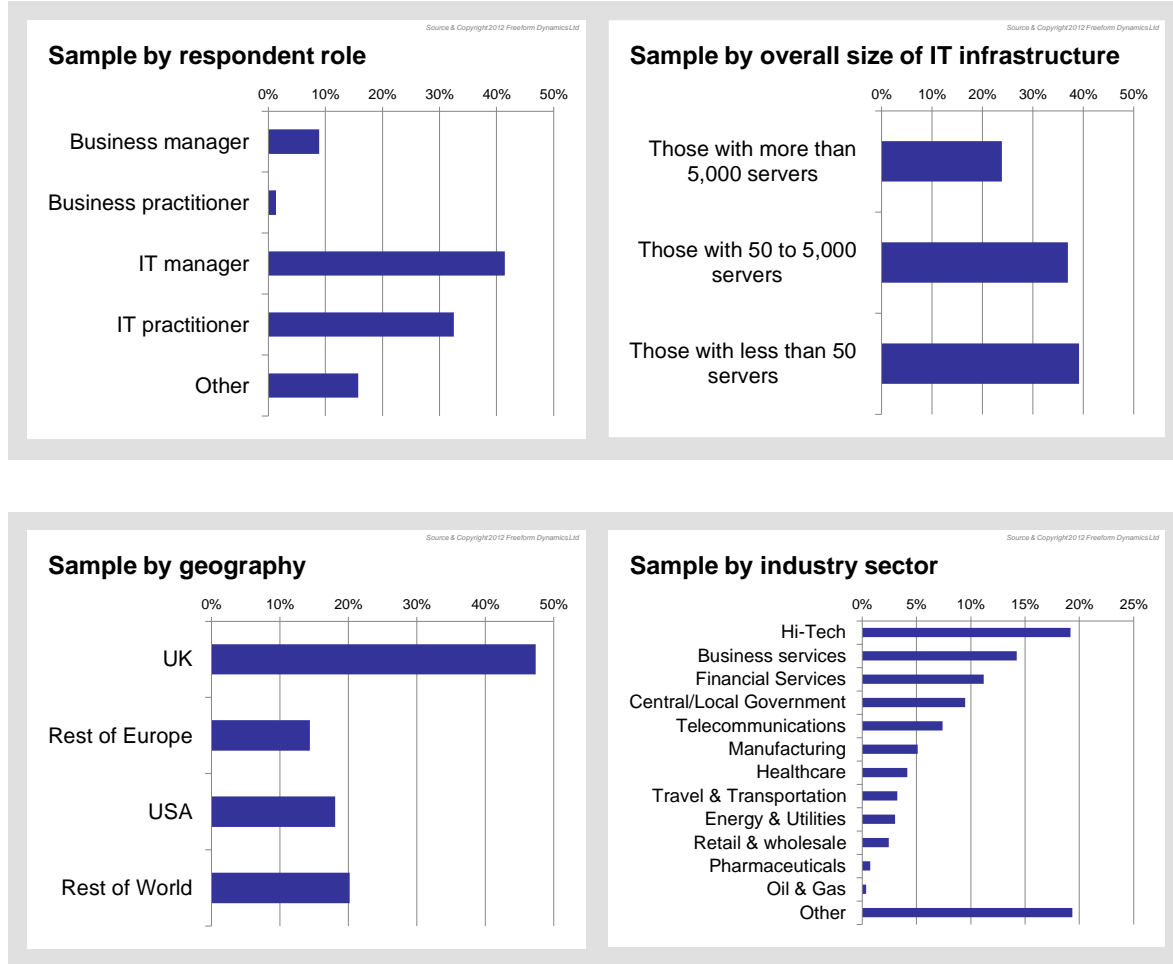
1. Cloud Computing Checkpoint: The first signs of more general mainstream acceptance?
2. Software Licensing and Subscription: Options proliferate internally and in the cloud

These reports are available for free download from www.freeformdynamics.com.

Appendix: Study sample

Feedback was gathered via an online questionnaire published on The Register news and information site (www.theregister.com). The 570 respondents were predominantly IT professionals and managers with some representation from those in non-IT positions.

The sample distribution was as follows:



A note on methodology

The web survey approach used in this study is subject to the 'self-selection' principle, which basically means that people with a greater knowledge of or interest in the topic are more likely to have responded.

Such self-selection does not undermine the analysis we have presented here as we have focused on the relative emphasis of different perceptions and types of activity. It does, however, mean that it would be inappropriate to regard any of the statistics we have used as a representation of the absolute level of need or activity across the market as a whole.

The study was completed in April 2012, and we would like to take this opportunity to thank all of those who took the time to participate. Your help is very much appreciated.

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