
Linux on the Desktop

Lessons from mainstream business adoption

Dale Vile and Martin Atherton, Freeform Dynamics Ltd, May 2009

The Microsoft Windows based desktop has been a fact of life in the mainstream business environment for so long now that it is often just accepted as a given. Some organisations, however, have been actively exploring and indeed successfully deploying alternatives, and the Linux based desktop is one of these. Based on candid 'warts and all' feedback from over a thousand experienced adopters, we take a practical look at the use of desktop Linux in a real world business context.

KEY FINDINGS

Desktop Linux adoption is primarily driven by cost reduction

When asked during a recent online survey of over a thousand IT professionals with experience of desktop Linux deployment in a business context, over 70% of respondents indicated cost reduction as the primary driver for adoption. Ease of securing the desktop and a general lowering of overheads associated with maintenance and support were cited as factors contributing to the benefit.

But deployment is currently limited, and challenges to further adoption frequently exist

The majority of desktop Linux adopters have only rolled out to less than 20% of their total PC user base at the moment, though the opportunity for more extensive deployment is clearly identified. In order for Linux to reach its full potential in an organisation, however, it is necessary to pay particular attention to challenges in the areas of targeting, user acceptance and application compatibility.

Selective deployment based on objective targeting will yield the highest ROI and acceptance

Rolling out Linux to power users, creative staff and highly mobile professionals can represent a challenge from a migration cost, requirements fulfilment and user satisfaction perspective. However, the needs of transaction workers and general professional users with lighter and more predictable requirements can be met cost-effectively with Linux without running into the same user acceptance issues. With groups such as this typically accounting for a high proportion of the user base, there is a clear opportunity to deploy desktop Linux selectively. Optimisation of the desktop estate is therefore likely to be achieved through a mix of Windows and Linux in most situations.

Linux desktop roll out is easier than expected for properly targeted end-user groups

Those with experience are much more likely to regard non-technical users as primary targets for Linux. The message here is that in practice, Linux is easier to deploy to end users than many imagine before they try it. For the majority of application types, including office tools, email clients and browsers, there is a strong consensus that the needs of most users can be met by native Linux equivalents to traditional Windows solutions. Where this is not the case, thin client or browser based delivery and/or one of the various emulation or virtualisation options are available.

A focus on usability reflects a maturing of thinking

In line with the acknowledged importance of a good user experience, usability is now the most sought after attribute of a Linux distribution. Together with the emphasis on cost reduction already seen, this suggests a maturing of attitudes in relation to Linux, shifting the previous focus on pure technical considerations to a more balanced view of what really matters in a business context. This observation is significant when reviewing the mainstream relevance of the desktop Linux proposition.

The research upon which this report is based was designed, executed and interpreted independently by Freeform Dynamics. Feedback was gathered via an online survey of 1,275 IT professionals from the UK, USA, and other geographies. The study was sponsored by IBM.



Introduction

The desktop Linux discussion is not a new one. With opinions often polarised on one side or the other, the arguments have become pretty familiar.

Advocates of Linux typically begin with a review of the perceived shortcomings of Windows around performance, stability, security and cost. They then go on to assert that Microsoft's dominance in this space stifles innovation and creates lock-in for customers that restricts choice and openness. Linux is then positioned as the antidote to such ills, and its open source heritage and maintenance model highlighted as key enablers of the benefits in terms of technical superiority and openness.

The other side of the argument often boils down to the notion of 'better the devil you know'. While few contest traditional desktop related challenges, many perceive that the cost and disruption of switching is likely to be more trouble than it's worth. Practical issues such as dependency on Windows applications and user acceptance are highlighted, and the argument is even heard that Windows actually represents greater choice as it is more broadly supported across the industry.

And so the debate continues at an ideological, technical and commercial level, quite often with extreme 'black and white' views detracting from a more objective consideration of the options. The end result is that the Windows-centric *status quo* has largely persisted.

More recently, however, a few things have happened that have made the desktop Linux debate more relevant. Microsoft's false start with Vista led to a degree of disillusionment with the relentless Windows upgrade spiral. While at the time of writing Windows 7 looks set to deal with many of the criticisms, most organisations are still facing a potentially disruptive upgrade to bring it on board. Meanwhile, there is much talk in the industry of a more centralised approach to desktop delivery via various virtualisation and/or cloud computing options. We then have the gradual creep of the Apple Mac into the enterprise, eating away at the edges of Windows estates.

All of this, together with the general backdrop of the economic downturn, has brought the question of desktop strategy to the front of peoples' minds, and it is in this context that it makes sense to revisit the desktop Linux proposition and the practicalities associated with it.

Objective of this report

Against the above background, this report is intended to provide an objective review of where and how Linux might fit into your desktop related plans and activities moving forward. The aim is to deliver insight rather than recommendations – i.e. it is not our intention to either advocate or discourage desktop Linux adoption, just to help IT professionals understand the potential benefits, issues and practicalities so the fit can be assessed in the context of your own IT and business environment.

Inputs into the discussion

Most of what's presented in this report is derived from a research study completed in April 2009 during which input was gathered from 1,275 IT professionals. The majority of these, around 90%, had direct experience of desktop Linux deployment in a business environment as a manager, consultant and/or in a hands-on capacity. A good cross section of organisation sizes was represented, and further details of the study sample are provided in Appendix A.

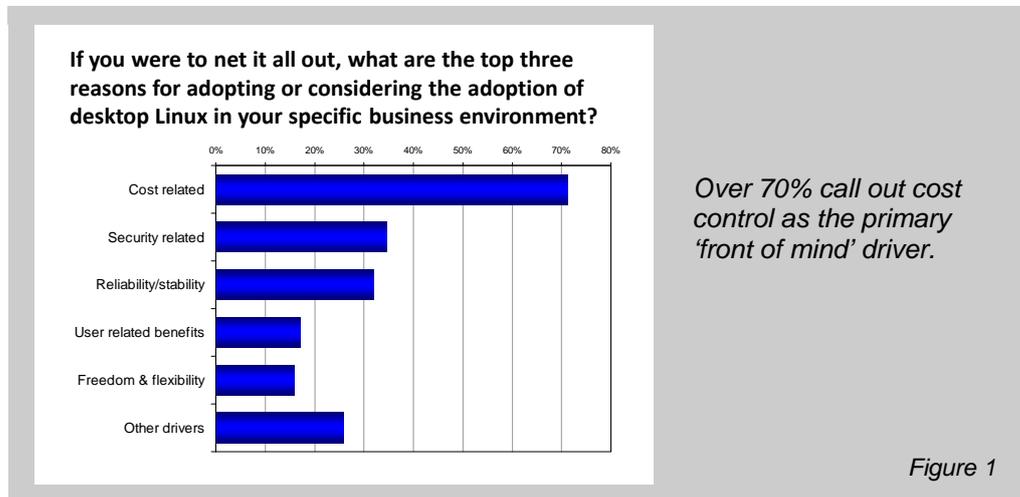
In terms of methodology, participants completed survey hosted on www.theregister.com based on a mix of multiple choice and open questions, the latter allowing respondents to express themselves freely in key areas. In terms of the questions themselves, the majority were concerned with activity in a business context, which apart from yielding the kind of input we were seeking, would have been difficult or impossible to answer by those without relevant experience. This minimised the dilution of business related insights by pure hobbyists and enthusiasts who often have a different perspective.

The study was sponsored by IBM, but was designed, executed and analysed on an independent basis by Freeform Dynamics under its Community Research Programme.

CAVEAT: All of the data presented in this report is based on a sample which was deliberately skewed towards the desktop Linux adopter community. While such concentrated experience is perfect for the purposes of this report, it is important not to misinterpret any of the statistics as relating to the IT or business population as a whole.

Why Linux?

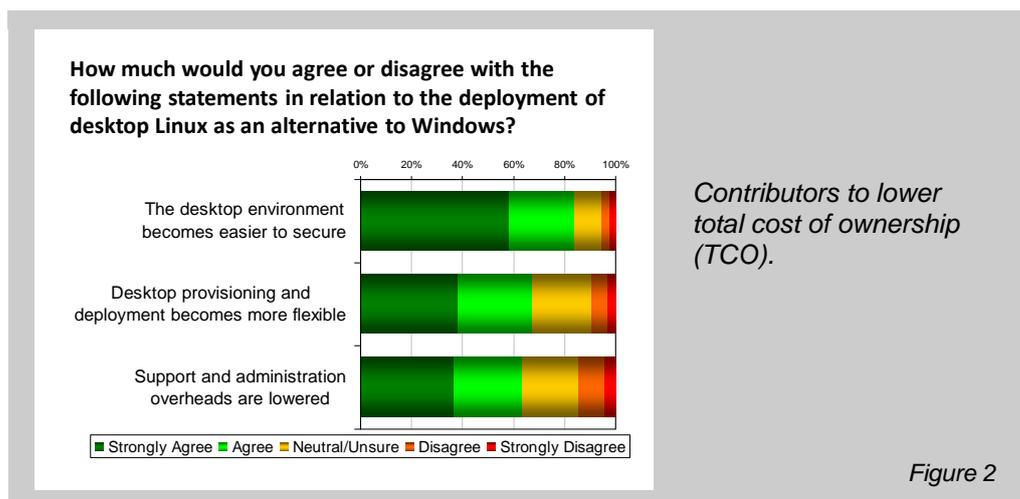
The first and most obvious question is why anyone would consider Linux as an alternative to Windows on the desktop in the first place. Responses from the study provide some initial insights here, and when asked in an unprompted manner, while the expected benefits associated with security (particularly in relation to malware avoidance) and reliability are frequently mentioned, over 70% call out cost control in one form or another as the primary 'front of mind' driver (Figure 1).



The percentages we see here are based on the grouping of freeform responses into the categories listed. Within the cost related category, many allude to savings on licences, not just in relation to the operating system *per se*, but also the application portfolio which runs on it, which generally includes a high proportion of open source software in a Linux environment. The ability to run on lower spec equipment is another common cost related driver. It is notable, however, that the majority of responses make reference to an overall lowering of total cost of ownership (TCO).

Most adopters refer to an overall lowering of TCO

While open questioning like this is great for understanding how people express the benefits and drivers that are important to them, when we prompt respondents in more specific areas we can get more of a feel for what's behind the statements about lower TCO (Figure 2).



Of course in reality, some of the drivers and benefits we are looking at here are related. In particular, while some argue that it is possible to achieve a higher degree of security with Linux, which is basically a risk related driver, others say the main point is that it costs less in terms of time and effort to achieve and maintain an acceptable level of security, which brings us back to TCO. In a similar

manner, the perceived benefits in relation to stability and reliability would have a user experience related impact, but would also translate to reduced maintenance and support overhead.

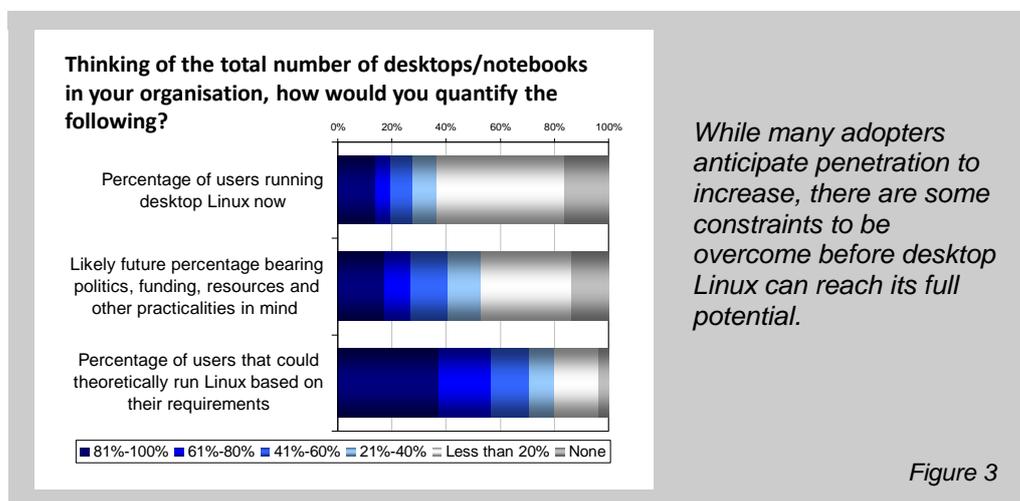
What's interesting about all of these observations is that the focus among those with more serious business-oriented deployment experience is very much on tangible benefits. This is in stark contrast to many of the emotional and ideological related arguments we hear from the more extreme factions within the open source community, whose noisy and forceful views often detract from the practical and objective discussion of value that should really be taking place.

Serious adopters focus on more tangible benefits

Related to this is the question of where desktop Linux fits into the business computing landscape. Should organisations be aiming for a wholesale replacement of Windows as many Linux evangelists would suggest, or is there a middle ground?

Deployment status, plans and aspirations

Exploring the desktop Linux footprint within adopter organisations can tell us a lot about initial adoption behaviour and the overall potential that exists. It is interesting, for example, to compare the degree to which adopters have rolled out desktop Linux to date, the anticipated footprint bearing current constraints in mind, and the ultimate theoretical potential (Figure 3).



The first bar on this chart tells us that while some adopters have rolled out desktop Linux quite widely, the majority at the moment have only deployed it to less than 20% of their desktop estate. Even within the current adopter base, it is therefore clear that the Linux footprint is generally quite limited.

It is important to avoid the trap of thinking in 'all or nothing' terms

The rest of this chart tells us a couple of important things. Firstly, it is notable that none of the bars reflect an overall sentiment of 'Linux everywhere'. Most respondents acknowledge that while there may be strong operational and cost benefits to deploying Linux, a proportion of users will typically best be left on Windows,

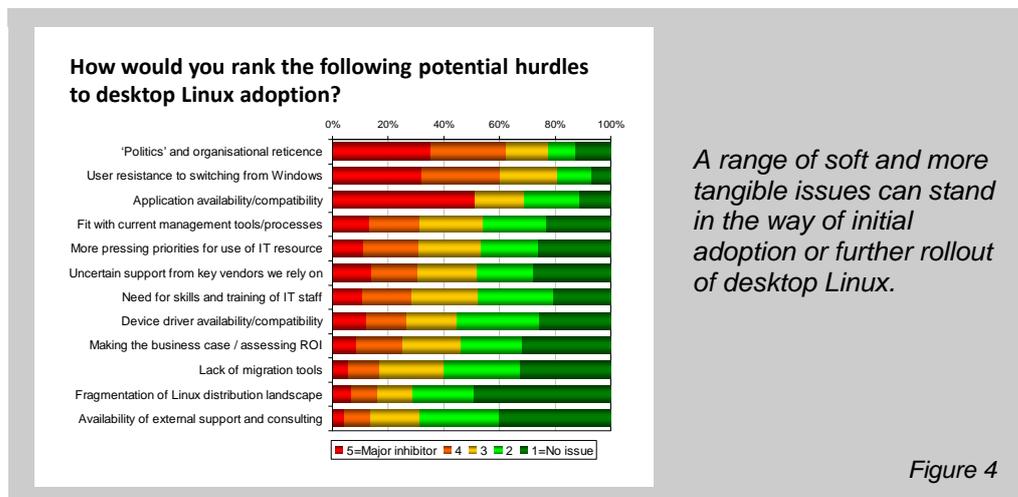
and in some cases this proportion may be quite high. We'll be exploring the question of fit with different user requirements shortly, but suffice it to say in the meantime that when considering desktop Linux adoption, we should avoid the trap of assuming it has to be 'all or nothing', which can be a very daunting prospect that discourages serious investigation.

The second important observation is the difference between the bottom two bars on the chart. This tells us that while current adopters see an opportunity to take significantly more advantage of Linux, constraints and hurdles exist that must be dealt with before the full potential can be reached. Whether you are considering, planning or already involved in a desktop Linux initiative, this highlights how important it is to be prepared for the kind of challenges you are likely to face, so let's take some time to understand these.

Hurdles need to be overcome for full potential to be reached

Understanding the challenges

To move forward successfully, it is important to be prepared for the challenges as well as appreciating the opportunity, and when we look at these, we see both soft and more tangible issues (Figure 4).



The top two issues highlighted, which relate to organisational and user resistance, are partly down to the commonly encountered mindset of: “If it ain’t broke, don’t fix it”. From a user and business management perspective, while they might occasionally moan and groan about Windows, it is an environment they are used to which largely does the job, and the fear is that any change will be painful and distracting. There is also the question of consistency between the work environment and the software used at home, which is overwhelmingly Windows based. Against this background, the Linux option is sometimes considered to be the ‘techie’ alternative which, even without any direct experience, is often dismissed as not being appropriate for normal users.

The fear from users is that any change will be painful and distracting

Beyond these more perceptual objections, some users that have been exposed to Linux may not have had the greatest of times, either because the experience was too alien or they missed their familiar Windows applications. This last point leads us to the challenge of application availability and compatibility, which as we can see from the third bar on the above chart, is called out as another significant potential hurdle to successful deployment.

While a range of other issues are acknowledged, none of them are as prominent as the top three. This is good news as traditionally problematic areas like device driver compatibility, fragmentation across distributions, etc seem to be far less of a worry than they have been in the past. This leaves us free to focus on the issues of end user needs and application delivery, which are clearly related.

The targeted approach to meeting end user needs

Microsoft Windows has traditionally been considered to be horizontal in nature, i.e. putting version and edition differences to one side, it pretty much does the same job and looks the same regardless of who is using it. When considering an alternative, however, we must take on board the notion that the operating system itself is just a means to an end, and from a user perspective, it’s the applications that run on it that really matter.

As soon as we start thinking in this way, it is clear that there are very marked differences between user requirements. While the needs of some types of user are quite simple and generic – e.g. email, word processing and perhaps a little web browsing – others might be dependent on very specific applications that are critical to their job – e.g. accounting software, design tools, and so on.

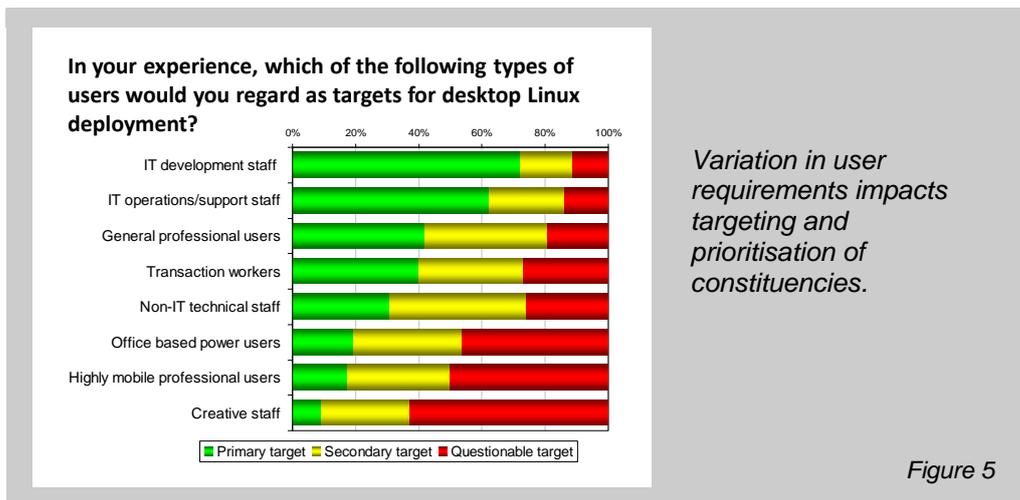
Thinking along these lines, it is possible to segment users into requirements categories. While each organisation might do this in a different way according to the nature and composition of their user community, for the purposes of our research, we inquired about a range of user categories to which most respondents could relate:

- IT development staff
- IT operations/support staff
- General professional users (relatively light and predictable use of e-mail, office tools, etc)
- Transaction workers (mostly using enterprise applications in a routine prescriptive manner)
- Other (non-IT) technical staff (e.g. engineers, technical designers/architects)
- Office based power users (e.g. finance staff, marketing teams, knowledge workers, etc)
- Highly mobile professional users (e.g. sales, roaming managers, etc)
- Creative staff (non-engineering, e.g. graphic design)

During the survey, respondents were asked to run down this list and provide an opinion on whether they regarded each category to be a 'Primary target' for initial deployment, a 'Secondary target' that they would recommend deploying to only after gaining some experience with desktop Linux, or a 'Questionable target', to which rollout may prove problematic for some of the reasons we have already discussed.

General professional users and transaction workers could well be primary targets for desktop Linux

Not surprisingly, there is a general view that Linux is a potentially good option for IT staff, whether in development or operations and support, with many also believing that general professional users and transaction workers could well be primary targets too (Figure 5).



Variation in user requirements impacts targeting and prioritisation of constituencies.

Figure 5

Homing in on general professional users and transaction workers, much of the anecdotal feedback from respondents highlights the adequacy of open source alternatives to traditional Windows options for their relatively light and predictable needs, with frequent mentions of open source suites being 'good enough' for the majority of requirements. Having said this, a number do allude to document format related issues, particularly when there is a need to exchange files with Windows users in other organisations. It's issues such as this that seem to make the difference between whether users in

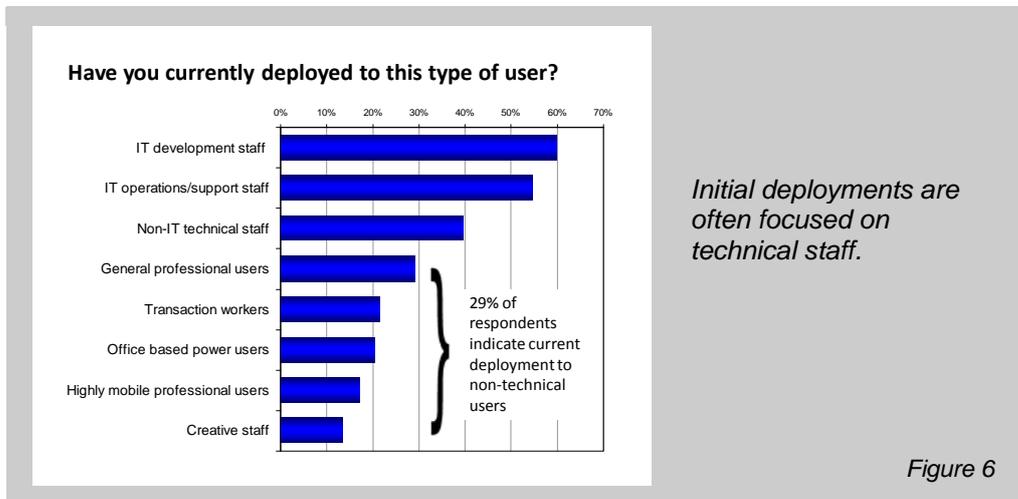
Power users, mobile professionals and non-technical creative staff are more questionable targets

these categories are considered to be primary or secondary targets, though most feel the challenges can be dealt with; less than a quarter of respondents, for example, regard these user categories as questionable from a targeting perspective.

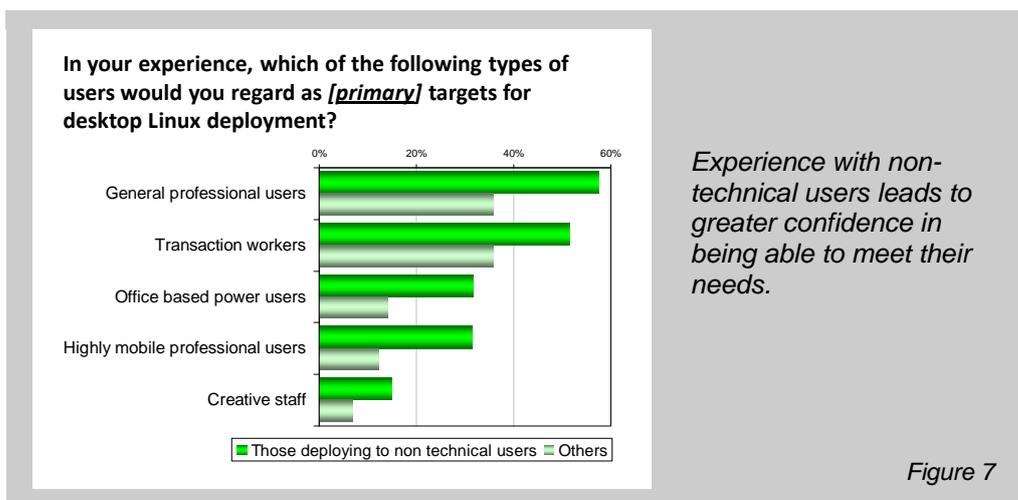
However, the other important observation from the above chart is that power users, mobile professionals and non-technical creative staff are much more likely to be considered questionable targets. This is understandable as users in these categories are often dependent on a range of Windows applications which may not be easy to support or replicate in a Linux environment. Many such users may also be wedded to more advanced functionality in Microsoft Office that is just not available in open source office suite alternatives. Anecdotal feedback particularly highlights the dependency of some business

users on Microsoft Office macros, and points to the investments that have been made in acquiring skills and familiarity in this area.

Current deployments largely mirror the prioritisation picture we have just been looking at, with the majority of activity currently associated with technical staff (Figure 6).



This in itself is interesting, in that less than a third of adopters have deployed desktop Linux to non technical users at the moment, which, after all, represents the bulk of the opportunity. When we compare the views of those that have moved Linux into this space, however, with those only using Linux in technical domains, some very interesting differences are revealed (Figure 7).



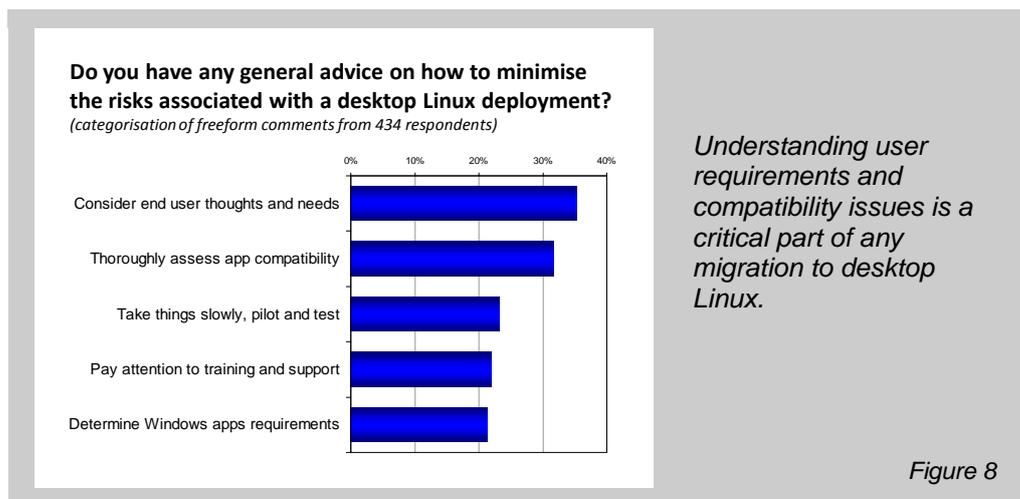
As we can see, those with experience of deploying to non-technical end users are more bullish about targeting. Respondents with this kind of experience are clearly indicating that actual deployment was not as challenging as they originally perceived.

While findings such as these are very encouraging, however, feedback suggests that a lot of mistakes and false starts have been involved in some of the adoption activity that has taken place, and this, in turn, has led to the mixed levels of satisfaction among user communities as previously discussed. Let's not forget that many respondents still perceive issues with business and user acceptance standing in the way of Linux fulfilling its full potential on the desktop.

Those with experience are much more bullish about targeting end users

The fact is that the devil is in the detail, and failing to cater adequately for just a single application that a user or business manager regards as important will lead to satisfaction issues and create or reinforce departmental or line of business level resistance that will hamper further progress.

With this in mind, it is not surprising that the most common pieces of advice offered by respondents are to consider end user thoughts and needs and take application compatibility seriously (Figure 8).



Given the importance of the application compatibility question, let's look at it in a bit more detail.

Drill down on application compatibility

Those using desktop Linux for a while may already have settled on a portfolio of native applications that provide the functionality they need. For most, however, the point of reference when considering a Linux deployment is the portfolio of applications currently being run on the Windows platform.

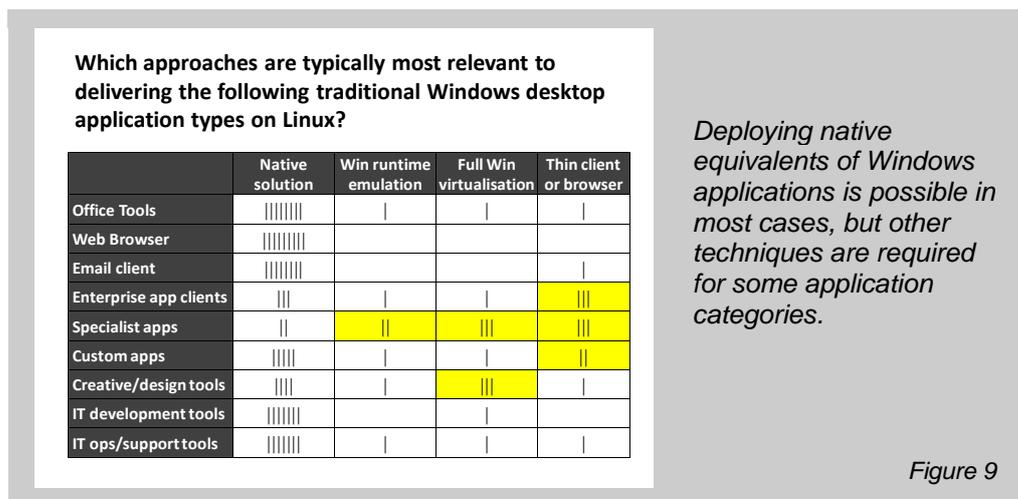
With this in mind, we explored during the research how the application functionality that has historically been run on Windows could best be provided on Linux. In order to do this, we defined a list of commonly encountered application categories as follows:

- Office tools (word processing, spreadsheet, presentation)
- Web browser
- E-mail client
- General enterprise app front-ends (e.g. ERP, CRM)
- More specialist business applications (e.g. role or line of business specific)
- Custom applications (e.g. built in-house or by SI)
- Creative/design tools
- IT development tools
- IT operations/support tools (e.g. systems management, DBA, etc)

We then asked respondents to indicate how the application types were typically handled, with reference to the following frequently encountered methods:

<i>Native Linux solution</i>	<i>Deploy native Linux equivalent of original Windows application to deliver the same or similar functionality</i>
<i>Windows runtime emulation</i>	<i>Run original Windows application using runtime emulation, e.g. Wine or CodeWeaver's CrossOver</i>
<i>Full Windows virtualisation</i>	<i>Run the original application using full copy of Windows, via either a virtual machine or the dual-boot approach</i>
<i>Thin client/browser access</i>	<i>Run the application on a server and provide access to it via the thin-client or browser based approach</i>

The end result is a matrix indicating the most common ways in which each application type is dealt with from a migration perspective (Figure 9).



The number of bars shown in each cell on the matrix indicates the number of respondents who regard that deployment option for that application type to be typical, where 1 bar is equivalent to 10%, 2 bars to 20% and so on.

The first observation we can make is that the preferred option of running a native solution appears to be possible in the majority of cases. In some situations, this will be simply the Linux version of the application that has traditionally been run under Windows. With software vendors now increasingly making Linux ports of their products available, this will become even more of a possibility over time.

The preferred option of running a native solution appears to be possible for most application types

When a straight port of the original Windows application is not available, it is often possible to identify alternative applications that will run natively on Linux and provide the same or similar functionality.

Well proven open source equivalents to most common Windows packages are available

Some obvious examples here are OpenOffice.org or Lotus Symphony as a substitute for Microsoft Office, or GIMP as an alternative to Photoshop. Much of the feedback received during the study made the point that reasonably well-proven open source equivalents to most common Windows packages are now available, but the alternative could equally well be a natively running commercial solution.

There are, however, areas in which it is often necessary to run the original Windows application because there is no suitable native equivalent, and these are indicated on the above matrix by the yellow shading. Enterprise application front ends and custom built applications are often re-deployed using a thin-client or browser based approach, and full Windows virtualisation or dual-boot is often necessary to support creative tools, with Adobe's Creative Suite being the most frequently mentioned here. The 'specialist apps' category causes the most challenges, and as this is a bit of a catch-all, how much it will contain depends on the size and nature of the organisation.

While matrices like the one we have presented make everything look clear and neat, the amount of review, testing and remedial work they hide can be significant. Such work is important, however, to meet business requirements and achieve user and departmental or line of business level acceptance as previously discussed.

Thorough review, testing and remedial work is critical to meeting business and user requirements

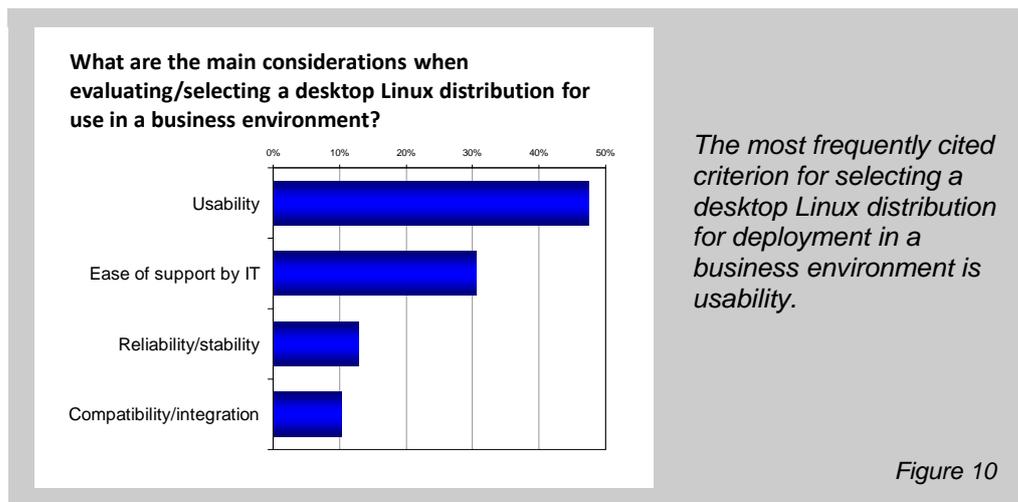
Meanwhile, there is another technical consideration that it pays to make decisions around up front, and that is the 'flavour' of Linux you will be deploying, i.e. the 'distribution'.

Distribution related considerations

One of the most common historical criticisms of Linux, particularly in relation to desktop deployment, has been the perception of fragmentation across multiple distributions (Red Hat, SUSE, Ubuntu, etc). The adopters participating in our study, however, generally do not see a problem here, with less than 17% alluding to issues in this area (as seen earlier on Figure 4). Nevertheless, there are still multiple distributions in frequent use, and to keep maintenance and support overhead to a minimum, and to avoid incremental compatibility issues, it is necessary to choose between them.

Usability is key when selecting a distribution

When an open question is posed on the main considerations to bear in mind when evaluating distributions, criteria such as ease of support and stability are mentioned, but the majority of the feedback received is concerned with usability in one form or another (Figure 10).



This focus on usability is consistent with the emphasis on user requirements and acceptance that has been highlighted in numerous ways throughout this study. Together with the highlighting of cost reduction we have already seen, this suggests a maturing of attitudes in relation to Linux, shifting the previous focus on pure technical considerations to a more balanced view of what really matters in a business context.

Discussion and conclusion

While we cannot infer overall mainstream penetration or trends from a study like this based on feedback from existing adopters, it is clear that some maturing is taking place in the whole desktop Linux arena. The technology has moved on, and some issues that have dogged Linux related activity

Some traditional Linux challenges are notable by their lack of prominence

in the past, such as fragmentation across distributions, inferior end user experience, and device driver compatibility, are notable by their lack of prominence in the feedback we have received.

We can also be encouraged by the high appreciation within the adopter community of the need to put more of a focus on end user views and requirements. This is important because sadly, many have been turned off in the past by the often encountered evangelist attitude of “The answer is Linux, now what was the question again?”. With this in mind, it is extremely useful to see IT professionals with experience of real-world deployment in a business context provide insights into which types of user are more appropriate targets for Linux and, equally, which are not.

For organisations yet to evaluate the desktop Linux option, such insights are invaluable. They reassure those exploring adoption for the first time that selective deployments are OK, and that it isn't necessary, or indeed usually advisable, to embark on a potentially highly disruptive wholesale replacement of a Windows estate. Armed with the knowledge that the best place to start is with general professional users and transaction workers, while avoiding, at least initially, power users,

creative workers and highly mobile professionals, we have a pretty good steer on how to maximise the chances of sustainable success.

Some may regard this limited approach as not ambitious enough, but the reality is that those with relatively straightforward and predictable requirements actually make up the bulk of the user community in most organisations.

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Any IT department interested in exploring desktop licence fee reduction and the other claimed TCO benefits of Linux could therefore probably identify a sizeable subset of their user base with which the opportunities may be explored safely and productively. Focusing initially on users with less sophisticated and diverse requirements will also help to keep the cost and risk of migration activity under

Be prepared to find that it is simply not cost effective to switch some users from Windows

control, particularly given the criticality of thorough needs assessment, compatibility testing and remediation work as part of any migration exercise.

That's not to deny the opportunity for broader rollout, of course, as many have successfully deployed Linux to more demanding users. More qualification will be necessary with these, however, and cost and risk will be higher. It is therefore advisable to gain some experience before assessing and potentially tackling these more challenging targets. Be prepared, however, to find that it is simply not cost effective to switch some users from Windows, either from an IT or business perspective.

Zooming out a little to look more broadly at developments in the desktop computing arena, it is worth considering how Linux compares with the Apple Mac, as the latter has started to creep into many organisations through user demand. In many ways, these two options are actually very complementary. While the Mac is often considered suitable for smaller groups of sophisticated users

Mac and Linux are very complementary

who care intensely about their computing environment, cost and manageability issues are likely to prohibit large scale deployment. It would be difficult, for example, to make a business case for converting large numbers of Windows users to Macs, particularly as Windows 7 potentially neutralises many of the historical differences between these platforms. Linux, on the other hand, lends itself very well to cost

effective large scale rollout, particularly to the groups we have identified who care much less about the computer on their desk, and simply regard it as a tool to get their job done. The Mac, and indeed the current Microsoft desktop, represents overkill for such users.

And in terms of the broader systems evolution context, the openness and efficiency of Linux means it potentially fits quite naturally into discussions around virtualisation and cloud computing.

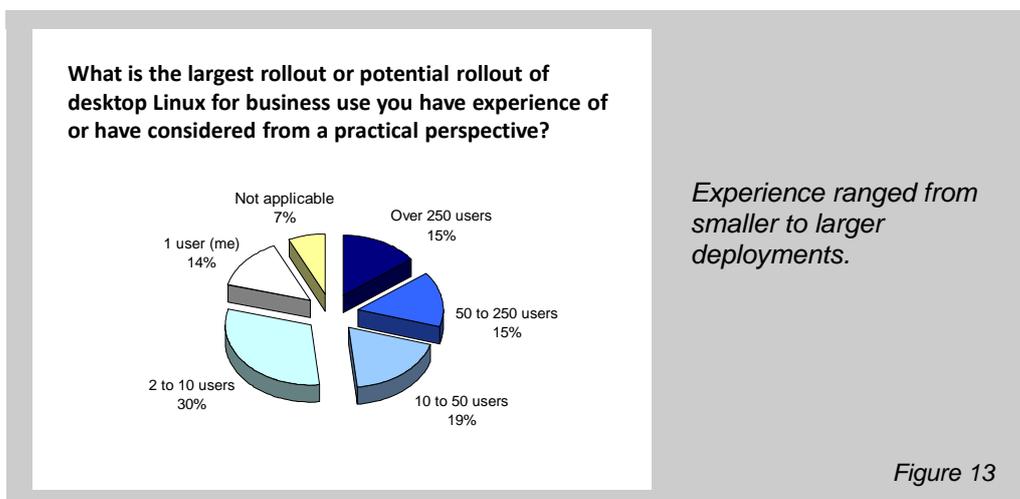
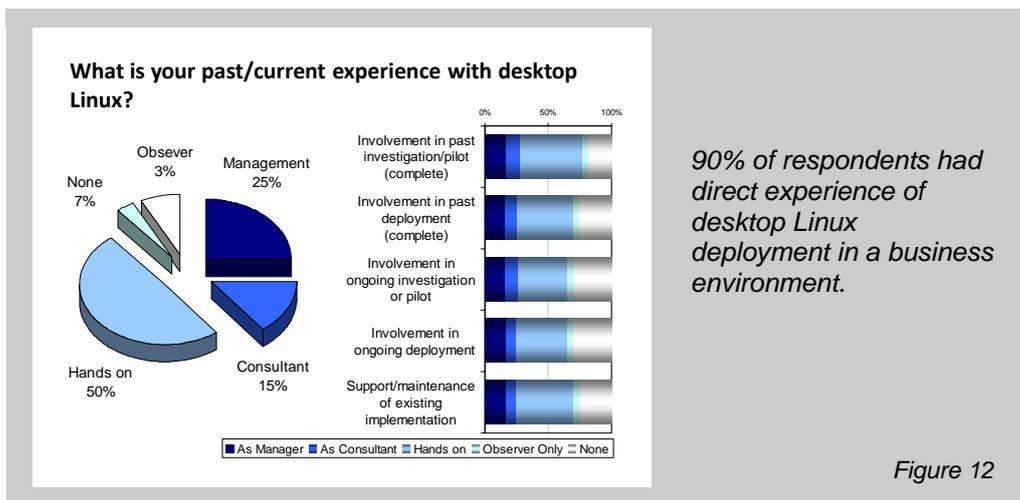
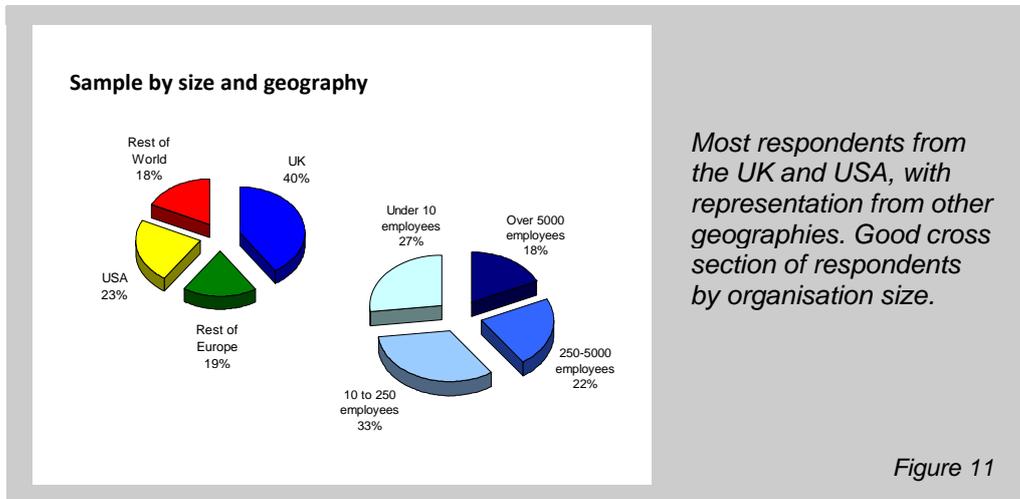
We have to be realistic though. While adopters are very clear about the potential TCO benefits, a desktop migration can consume considerable budget and resource, and cause significant disruption. You may therefore decide that the time, money and effort required would be better spent elsewhere, depending on your priorities. You may also decide that Linux is simply not right because of the mix of users you have.

Sooner or later it may be useful for 'Windows shops' to explore the possibilities offered by the Linux alternative

At some point, however, if you are a 'Windows shop', you will undoubtedly be faced with a costly migration anyway to the next generation of the Microsoft desktop. Sooner or later, it may therefore be useful to explore the possibilities offered by the Linux alternative. We hope that when that time comes, if it hasn't done so already, the insights in this report prove to be of use.

Appendix A – Research Study Sample

The data presented in this report was derived from a research study completed in April 2009 during which input was gathered from 1,275 IT professionals via a Web based survey. Distribution of the sample was as follows:





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