



Windows 7 White Paper

Migrating to Windows 7: Overcoming Application Compatibility Issues II

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Load it. Run it. Fix it. It's



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Executive Summary

We wrote our first Windows 7 white paper back in February 2009. At this time we had an early beta version of Windows 7 running on our computers, we had not seen the compatibility cookbook from Microsoft and we had some good but limited intelligence from within Microsoft and other advanced technical sources. At that time we had a “best guess” at what compatibility issues we would be encountering. Since then Windows 7 RTM has been released, the cookbook has been updated and circulated and Windows 7 is widely used among the early adopters in the technical community. The great news is that the application compatibility landscape has not changed significantly in that intervening period. There have been changes like the introduction of XP mode and we have been able to refine our reporting and fixing to a very high level of coverage. Having carried out more than 20 Windows 7 proof of concepts with large global organisations in the last 3 months we now know far more precisely just what technical issues organisations will face as they migrate to the new OS and importantly just how much of their portfolio they can get working on the new platform. And the news is encouraging for both customers and Microsoft.

Back in March 2009 we said

“Windows 7 and Vista are based on the same platform, are subject to the same rules, and will experience the same compatibility issues. Additionally, Windows 7 introduces more security features and these will also need to be complied with in order to get an application to install and function correctly. To migrate to Windows 7 an organisation will need to surmount all the Vista compatibility issues AND the new Windows 7 compatibility rules. Between 60-80% of applications will need some remediation to meet the requirements to be deployable to Vista. Around 5% will not work at all and will require vendor or programmer upgrades. Initial tests show that 8% will be further affected by the additional restrictions imposed by Windows 7 based on the current beta release and published documentation.”

- **50-80%** of applications will need some remediation to meet the requirements of deployment under Vista
- **5%** will not work at all without vendor or in-house programmer upgrades
- **8%** or more are likely to be affected by the additional restrictions imposed by Windows

So if this was how we saw things back then, how much has changed. Based on our proof of concepts to date – where we have tested samples of complete portfolios from 50,000 plus applications - remarkably little. The numbers we gave then pretty much accurately reflect our current experience. And the advice we gave then still stands.

“You will still have to overcome all the compatibility obstacles, so start your compatibility testing and remediation program early”.



An overview of application compatibility and Windows 7

The uptake of Windows Vista on the domestic market has been good, mainly because new PCs are shipped with Vista by default and also because individuals do not concern themselves with managing their desktop environment in the same way as a business. But the uptake of VISTA in the corporate space has been a low 4-5% according to sources such as **Information Week**. This can be attributed to a number of issues: people being concerned with the fundamental changes between the XP and Vista operating systems; performance issues; the requirement for a desktop refresh; and last but not least the effort to migrate – the largest component of which is the testing and remediation of application compatibility issues. The scale of change introduced by Vista which includes a completely new kernel, a raft of new security measures and rules, and a number of deprecated components and APIs, meant that the majority of applications within an estate would either require some remediation, fail to work correctly or possibly fail to install altogether.

Steve Ballmer was quoted in **Computer Weekly** (Oct 2008) saying

"We [improved] security in Vista, but we had to break backwards compatibility to make it secure," he said. "As a result, applications had to be reengineered for Vista, slowing down adoption by businesses."

One year later almost to the day and just prior to the official launch of Windows 7 he was quoted in the Daily Telegraph speaking on the failure of Vista

"We got some uneven reception when [Vista] first launched in large part because we made some design decisions to improve security at the expense of compatibility. I don't think from a word-of-mouth perspective we ever recovered from that." Daily Telegraph (Oct 5 2009)

So will things be any easier with Windows 7?

Windows 7 has addressed many of the issues that people had with Vista and improved both real and perceived performance. So what then of the remaining issue of application compatibility? Mary J Foley, one of the key commentators in the windows space and on compatibility concerns in particular has said:

"One point worth repeating when thinking about application compatibility and Windows 7: Applications that weren't compatible with Vista aren't going to magically work with 7"

And advises corporate windows users...

"As Microsoft officials and some market researchers have cautioned customers, moving straight from XP to Windows 7 will be as painful from an app-compat standpoint as was moving from XP to Vista. That's why many pundits have suggested business users who aren't planning on skipping Vista still run some pilots so they can see just how compatible their apps and drivers are likely to be with Windows 7."

<http://blogs.zdnet.com/microsoft/?p=1694>

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Some industry players are suggesting that application compatibility will be less of an issue with Windows 7 than it is for Vista. They argue, for example, that there will be fewer unsupported driver issues. We have to be careful in how we interpret this. It is true that there are more compatible drivers in existence now than there were 2 years ago when Vista was launched and if an application uses one of these new drivers then that part of its application will work fine. However, for people that are migrating from W2K or XP, if they have applications using drivers that are incompatible with Vista then they will still be incompatible with 7. So for certain classes of issue there will be fewer application failures. This is due to the fact that in the last 2 years some older applications will have been retired to be replaced by newer ones with newer, compatible, drivers. However in all likelihood this will not amount to a significant proportion of a portfolio. The failure rate of applications with driver issues will in all likelihood drop from say 4% to 2%.

Microsoft has also been working at providing mitigations of its own to the compatibility problem. One of the most recent to be announced is **XP mode**. This is a virtual machine running XP within Windows 7. The idea is that if you have some applications that will not work on 7 then you can always deploy them onto your XP virtual machine. In reality this has problems. From a corporate perspective this is an unattractive option as the VM is completely unmanaged. There are no tools to manage updates and security patches so it unfortunately opens itself to security breaches which administrators can do little about. At the other end of the market for home users and particularly gamers the performance is unlikely to give satisfactory results. This was discussed at length recently on a Microsoft round table on virtualisation in which we took part. The full show can be viewed here (<https://ms.istreamplanet.com/springboard/>) where the limitations of a number of these stopgaps are openly discussed. It would seem that there is no magic bullet when it comes to application compatibility. The problems really need to be identified and resolved.

Making the jump to Windows 7



The best way to think of the problem is to liken it to a stack. The stack of rules that you have to hurdle to get to Vista, still need to be hurdled in order to get to Windows 7. However, there will be additional rules added to Windows 7 that also need to be hurdled to reach that platform. A few more of your applications may be compatible with regard to driver issues and other upgraded features if they have been renewed/updated recently, however they will need to comply with all checks to install and work correctly.

Most issues that can be remediated via the installation routines. For the remainder they will need to revert to the vendors for upgrades or send them back to the in-house development teams for remediation.

The ChangeBASE Application compatibility checks

ChangeBASE already has a full suite of plugins for testing and remediating issues relating to Vista compatibility. These cover areas like deprecated components and APIs, non supported drivers, non accessible areas, UAC issues, legacy control panel applet and help file support, networking restrictions and group policy restrictions among others. ALL of these plugins are directly relevant to the issues that need to be identified for Windows 7

In addition to these we have added the extra checks required to deal with Windows 7. These have included upgrades to existing checks where functionality has been extended by Windows 7, and new plugins where new functionality has been added or removed

The areas where we have extended our checks include

- Active Directory GPO Settings
- Deprecated API Analysis
- Install Logic
- Non-Supported Drivers
- User Account Control Checks

Areas where we have introduced checks new and specific to Windows 7

- Common Dialogue Compatibility Analysis
- Microsoft Message Queue Analysis
- Portable Device Driver Update Analysis
- Root Drive Virtualisation Analysis
- Unsigned Driver Analysis
- Windows Resource Protection
- Windows File Library Feature Analysis
- Windows Mail Deprecated API Analysis

Findings from the Application Compatibility Lab (ACL)

We have now carried out a significant number of Windows 7 compatibility studies with clients and are in a position to feed back real data on the Windows 7 compatibility question.



How many REDS, AMBERS and GREENS?

At ChangeBASE when we test applications we classify them in to RED, AMBER and GREEN.

- Green means that we have found no compatibility issues and the application can proceed to user acceptance testing.
- Amber means that we have identified compatibility issues but that they are remediable by changing the installation routine (something we do automatically with our tool AOK).
- Red means that the application is using deprecated functionality or similar and will require programming changes. This can be done by the programming team with the information we provide if the application is in-house developed, or will require and upgrade from the ISV if it is a vendor application.

During our testing over the last 3 months on clients estates we have found that we are seeing the following averages

Classification	percentage
GREEN	34%
AMBER	61%
RED	5%

What are the most common issues?

As we would have hoped no major new issues have been introduced with Windows 7. Most of the new feature restrictions are showing up in testing but in the main the incidence is low compared to the feature restrictions introduced with Vista. The highest incidence of new features is The Root Drive Virtualisation. However this is an optional feature and can be managed out in the build by settings (see below in optional issues). So the profile of the main types of issue remain very similar across Windows 7 and Vista. We have summarised the average of the main issues encountered below.

Windows 7 Compatibility Issue	% Apps Affected	% Auto Fixable
Legacy Help Files	36%	100%
Windows Resource Protection	35%	100%
UAC File Header Issues	24%	100%
Custom Action Security	19%	100%
Legacy Control Panel Applet	13%	100%

Specific 64 bit findings

Probably the most significant restriction that has been added to Windows 7 is in the 64 bit environment. There is a new restriction that checks that all drivers are digitally signed. This will definitely increase the number of applications that fail to operate correctly when deployed to Windows 7 64 bit environments as the functionality supplied by that driver will be unavailable. A Microsoft statement reads

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Windows 7 64-bit enforces the use of signed driver binaries. Windows 7 32-bit does not... obtain a version of the driver that has been digitally signed (and cross signed – details are available in the Windows Driver Kit) by the vendor

In our findings, for people that are intending to deploy to a 64 bit environment this could double the number of applications that will we would flag as red. In one well managed estate we found that the number of applications that were flagged RED due to driver issues rose from 50 to 250 when checked for 64 bit compatibility. In a 3000 application estate this would equate to a rise from 1.5% to 8% for this single check.

Type of Driver checks	% applications failing
32 bit driver checks only	1.5%
32 + 64 bit driver checks	8.2%

Are there any optional issues?

While a number of new feature restrictions have been introduced in Windows 7 not all of them are mandatory. Depending upon the way the client environment is to be configured some can be ignored. For example, a number of Windows Mail APIs have been deprecated and applications that depend on this will fail to fully function correctly. However, if there is another mail or messaging client included in the build or on the machine then this will provide the missing functionality. This restriction we are seeing affect approximately 2% of the portfolio. However, for most organisations that use outlook, for example, this will not be an issue.

Similarly Root Drive Virtualisation has the capacity to affect a number of applications. For example both Oracle and Ease deploy/write to the C: drive. With virtualisation on these applications may not continue to function as expected as updates will not be able to find the install locations correctly. However again if an organisation finds that through its testing it is going to experience a high number of issues due to this feature it has the option to switch it off. Alternatively, they can modify the install location and test the application functionality.

How many can be automatically fixed?

The most important thing for any client when considering application compatibility is: How many of my apps can I get working? And how much effort is it going to take me to get my apps working. We have already answered the first question; an organisation should expect to get between 90-95% of their estate working on Windows 7 depending upon the age of their estate and whether they are deploying to a 32 or 64 bit environment. The second part of the question is how much effort is required to get them to this point. We are finding that we are using the fixing automation provided by AOK we can remediate about 95% of the Amber issues. The table below shows the application estates before we have applied automatic fixing and after we have applied it. The fixing for each application takes about 2 minutes.

Of course the same result can be achieved manually with the correct information. However the fixing times would change dramatically. It is estimated that each application would take between 4-16 hours to remediate manually and then would be subject to assigning the skilled resource and managing the human error factor.



Report Results	Initial Analysis	After Fixing
Green	34%	92%
Amber	61%	3%
Red	5%	5%

Conclusion

Moving to Windows 7 will not be any easier than moving to Vista. The reasons for choosing Windows 7 over Vista may be well founded, but one of the arguments will not be that the application compatibility task has gone away. There are some problems that have been mitigated, for example, the 2 years since Vista's launch means that the number of apps with incompatible driver issues will have decreased due to upgrades in the intervening period. Also XP mode will alleviate the problem of incompatible apps for some but is not really an enterprise solution and will also not benefit users with high processing requirements. . By contrast, organisations that have skipped Vista and migrate directly to Windows 7 will still need to plan to overcome all the Vista compatibility issues PLUS the added Windows 7 restrictions. ISV applications on average will be more compatible due to upgrades targeting Vista while in-house developed applications are less likely to change their compatibility profile (unless there has been a forward planning development team) due to the deployment environment having not changed in the last 2 years.

Early testing and piloting is essential for any organisation with a large portfolio. The task can be achieved manually but at the cost of a large workforce and a great deal of time. Or it can be carried out using automated tools that can identify and automatically remediate most of the issues.



Appendix

Options for compatibility testing and remediation

The effort to complete this task manually for an organisation is normally factored at the rate of 4 hours per app for basic OS compatibility testing. This would allow a basic coverage of the most accessible functionality but will still only cover a small proportion of the full functional behaviour of a system. And unless all functions are tested on a new OS then the results are only indicative with a level of accuracy equivalent to the amount of functionality tested. As any system tester will know, a full functional test of a system can take weeks or even months so the results gathered in 4 hours are open to a high degree of uncertainty. For example, one of the primary causes of application failure will be incompatible driver issues but unless the functionality requiring that driver is exercised, the failure will not be apparent until the user discovers it at UAT or worse still deployment time. Also the overhead in managing the staff, space and equipment to do this is non-trivial.

The alternative is automated testing. To interrogate an applications installation routine, files, registry settings and dependencies via a set of rules. This has a number of advantages over the manual testing approach.

It is faster

Using Changebase AOK it is possible to read in a thousand applications in less than 3 hours using a single machine. This can be increased further by adding additional workstations. To run the reports for 1000 applications would take approx 1-2 hours. Of course there is some overhead to gathering the applications together but that is the same whether the testing is manual or automated.

Testing Method	Estimated Effort
1000 apps manually	$1000 * 4 / 16 = 500$ plus man days
1000 apps using AOK automation	A few days at most

It is more accurate

Because all the rules are captured in a database, the same tests will be applied to every application. The testing is not subject to tester error or omission, it does not rely on specific user knowledge as to how to access or use various parts of the system's functionality. For example, every application will be tested for every deprecated component, API and driver; something that manual testing on a time limited budget cannot hope to achieve. Because AOK not only interrogates the installation routines but also the files and their dependencies it can ascertain the results normally assumed to be obtainable only by intensive and lengthy run-time analysis.

Results can be re-run as required

A huge advantage of automated testing with regards to application compatibility testing is the fact that tests can be re-run at little or no extra cost. For example, what happens if after testing 75% of a portfolio, new rules appear as part of a service pack that need to be

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tested for? With manual testing the whole process will need to be repeated. With automated testing using AOK a new plugin is dropped in, the tests are rerun and the results compared.

It can be automatically remediated!

Using AOK it is not only possible to identify the issues that need to be addressed to move applications to the next target platform; it is also possible to automatically remediate the vast majority of them. Normally, the task of remediating the issues can take many hours or days and require highly skilled resource to achieve the task. For corporations with large portfolios (some have in excess of 10,000 applications) this can mean recruiting, housing, training and managing an army of installation packagers. By using automation provided by AOK this number can be significantly reduced and the results will be repeatable and consistent. The time savings here are similar to or can exceed the savings made by using automated testing.

About ChangeBASE.

ChangeBASE AOK is the market leader in automated compatibility software enabling organisations to simplify and speed up the time it takes to test, remediate and manage the migration process between operating systems or deployment environments. The company has developed a suite of software applications which bring tangible benefits and reduced costs to organisations across the globe.

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