The Business of Interoperability
What really matters, and why?

Dale Vile, Jon Collins June 2010

'Interoperability' is a widely used word in IT industry circles, but it can mean different things depending on the context in which it is being considered. In this paper, we put IT industry politics and IT vendor interests to one side and look at interoperability from a business perspective, focusing specifically on matters of business value, cost and risk.

MAIN POINTS

Ease of interoperability within IT systems is more important now than it has ever been

Freeform Dynamics' research confirms it is not unusual for large organisations to have hundreds, if not thousands of applications running on a similar number of servers, with even small to medium enterprises typically having ten or more systems in place. The evidence tells us that while many business processes are dependent on multiple IT systems, the amount of manual activity outside of automated systems continues to translate into significant cost and risk to the business.

It is understandable therefore, that interoperability between IT systems is very much front of mind in many organisations. Meanwhile, industry trends in areas such as integrated solution stacks, cloud computing, unified communications and so forth have raised the stakes for interoperability still further.

Industry standards are not the 'be all and end all' of interoperability in IT

Whereas interoperability is frequently identified as a priority among mainstream IT professionals, a lower level of emphasis is generally placed on compliance with industry standards. This is in part because in many areas of IT, such standards typically lag the innovation curve: neither vendors nor customers are willing to wait for relevant standards to emerge and be ratified, or existing standards to be updated, before selling or adopting new and innovative solutions. Beyond this lag phenomenon, de facto and/or proprietary standards often exist that are already very effective at solving interoperability issues, reducing the urgency for official standards in many cases.

When evaluating interoperability needs, it is important to focus on business requirements

Business requirements can vary considerably, from basic file/batch exchanges at one end of the spectrum to highly optimised real-time system-to-system requirements at the other, so generalisation or dogma can be dangerous when setting policy. The following parameters are useful when analysing requirements – a) the business value of good interoperability in terms of increased flexibility, choice and responsiveness, b) the cost of poor interoperability in terms of process inefficiency and IT integration overhead, and c) the risk of 'interop-unfriendly' solutions that frequently lead to business constraints and vendor 'lock-in'.

In practical terms, interoperability risks relate not only to the openness of interfaces and formats, but also to the pervasiveness of solutions from a market incumbency and acceptance perspective. With these factors in mind, policies and investment criteria must be centred on the needs of your business, rather than idealism or any notion of there being a single 'right way' to do things.

These summary points are discussed further within the paper, along with examples and advice to help IT and business professionals navigate their way through this complex but important topic.

This report was commissioned by Microsoft and authored on an independent basis by Freeform Dynamics Ltd. It is based on input from a range of IT vendors and service providers, coupled with intelligence from large scale primary research studies into the investment and use of IT in a business context.

Contents

Introduction

The highly innovative history of the IT industry has nonetheless at various points involved wars of words between vendors and advocacy groups, each arguing that their way of doing things is the best. All too often, customers caught in the middle of these conflicts have been forced to bet on one faction or another as they have made important technology decisions. Where they have been fortunate enough to have backed the right horse, investments have been protected, but the wrong choice has often left them stuck with 'white elephant' systems and technologies.

What of today's IT landscape? It is fair to say that things are significantly better than the early days when pretty much every aspect of IT was proprietary and relatively closed in nature. Nevertheless, despite the efforts of standards bodies and various initiatives around the concept of 'open systems' over the years, we still don't live in a totally 'plug and play' world. Even though IT capabilities may seem reasonably well aligned at a high level, there are still interoperability consequences for many of the technology choices IT decision makers need to make today.

In fact, some recent industry developments actually threaten to take us backwards rather than forwards. For example, a number of large vendors and their partners have been promoting the value of 'integrated stacks', the components of which – servers, storage, networking, software, tools, etc – are delivered in a tightly coupled manner. In other domains, we are seeing database management systems being optimised for specific ERP systems, and the growing success of end-to-end mobile computing offerings in which devices, software and online services are tightly coupled. With examples such as these, you could be forgiven for thinking that the IT world is becoming a more closed and restrictive place.

Against this background, business and IT decision makers just want things to work together in a way that doesn't constrain their organisations now or in the future. The key to achieving this in a less than perfect world is a clear understanding of the principles and practicalities of interoperability, so choices and compromises, can be made in an informed and objective manner. The aim of this paper is to provide insights in this area, looking at the problem through a clear business lens.
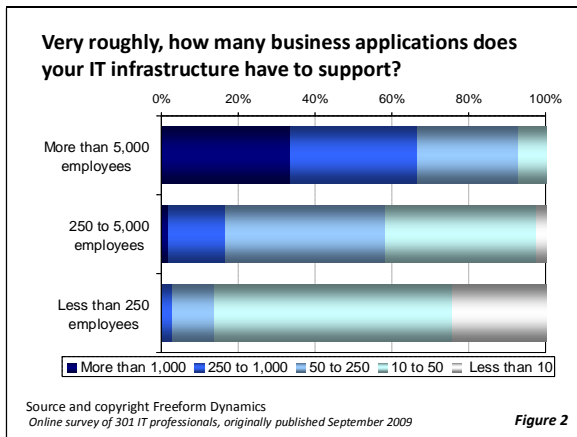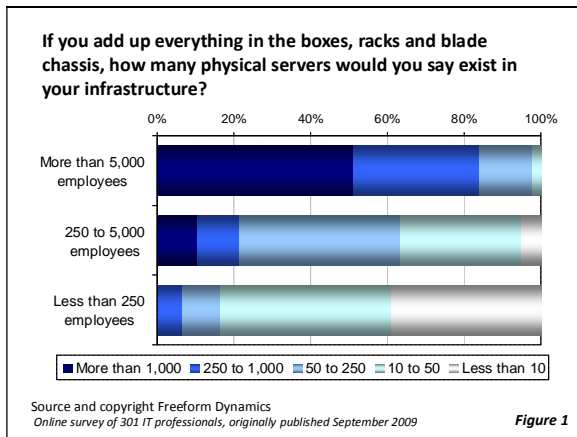
Inputs into this paper

This paper has been put together by Freeform Dynamics, based on in-depth briefings from a range of relevant IT vendors and service providers, coupled with the findings from a number of large scale research studies during which views were gathered from IT and business professionals on their experiences of deploying IT solutions in a business context. As such, we have taken into account both supplier and customer perspectives, allowing us to explore this interesting and important topic on an objective and impartial basis.

As you read this paper, you will see various charts and diagrams, some of which have been derived from the abovementioned research. Where this is the case, you will see a note on the chart providing a brief indication of the methodology, sample size and date of the originating study. More details are available via the reading list presented at the end of this document, which provides links to reports that are freely downloadable from www.freeformdynamics.com.
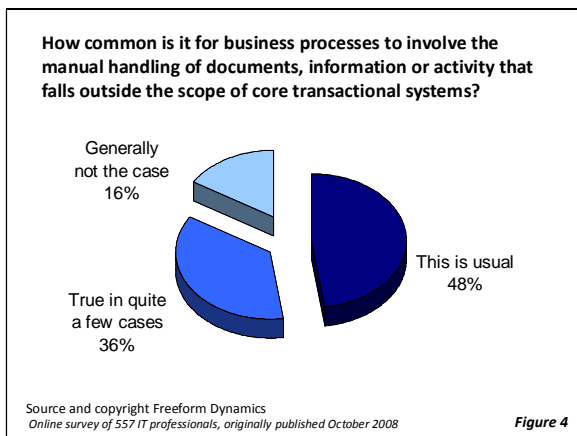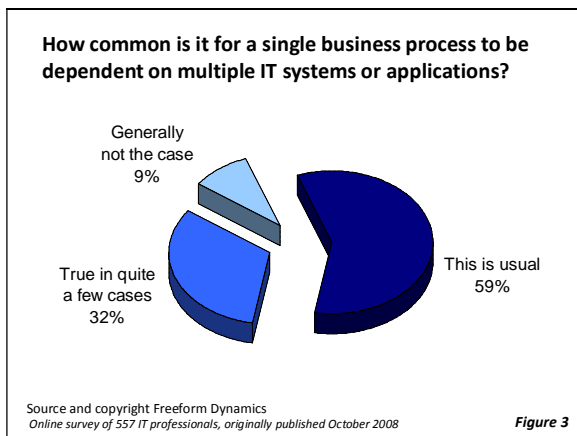
Defining the problem

Let's begin our discussion of interoperability by looking at the problem we are trying to solve from a business perspective.

Most businesses today are reliant to one degree or another on information technology. Indeed, all but the smallest of organisations typically have a number of different systems in place to support or enable different aspects of their business operations. If we look at the level of technology being used, we find that it is not unusual for large organisations to have hundreds if not thousands of applications running on a similar number of servers, with even small to medium enterprises typically having ten or more systems in place (Figures 1 and 2).

If you add up everything in the boxes, racks and blade chassis, how many physical servers would you say exist in your infrastructure?

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Online survey of 301 IT professionals, originally published September 2009

Figure 1

Very roughly, how many business applications does your IT infrastructure have to support?

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Figure 2

If we add storage equipment, systems software, management tools and everything running on the desktop into the mix, not to mention mobile devices, it becomes clear that keeping the various elements of the IT landscape working together in harmony can pose a significant challenge.

The importance of this challenge is something most IT professionals acknowledge and understand, but when you consider the degree to which many business processes are dependent on multiple IT systems, and the amount of manual document handling taking place when automation has not been implemented, the imperative to do something about it is reinforced considerably (Figures 3 and 4).

How common is it for a single business process to be dependent on multiple IT systems or applications?

Generally not the case
9%

True in quite a few cases
32%

This is usual
59%

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Figure 3

How common is it for business processes to involve the manual handling of documents, information or activity that falls outside the scope of core transactional systems?

Generally not the case
16%

True in quite a few cases
36%

This is usual
48%

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Figure 4

The study from which the above two charts were derived also revealed the common use of 'DIY' applications, in which users work around system disjoints arising from a lack of interoperability by building their own solutions, for example using desktop suites and other 'productivity' tools. This is not an ideal situation, given that such workarounds are often not adequately tested or supported, and that they can create all kinds of issues from a compliance, security and business integrity point of view, as well as being a distraction to all concerned.

It's not surprising, then, that many respondents also indicated that improving application interoperability was a frequent thread across IT project level activity, with some even creating over-arching programmes to put more direct focus on helping things work together more smoothly.

Findings such as these, along with other research highlighting the way in which business intelligence and business performance management activity is constantly hampered by systems fragmentation, underline the relevance of the interoperability question from a business perspective.

While the principle of improving the interoperability of IT systems is generally recognised as sound, the problem is that it is just one of many items on the IT department's agenda. Another Freeform Dynamics study showed that while interoperability was frequently identified as a priority, especially among organisations with a more progressive view of IT, imperatives such as security, data protection, and operational and capital cost savings were more prominent overall (Figures 5 and 6).
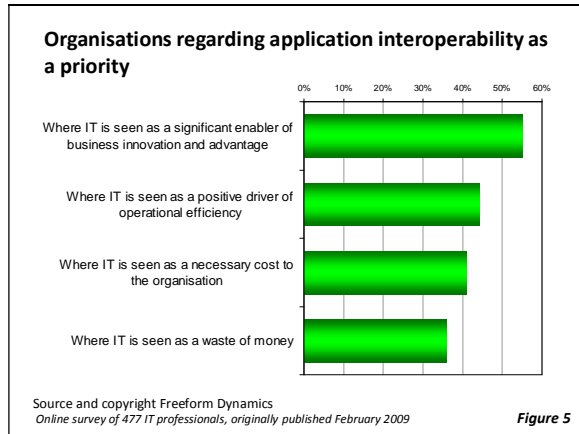

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Figure 5

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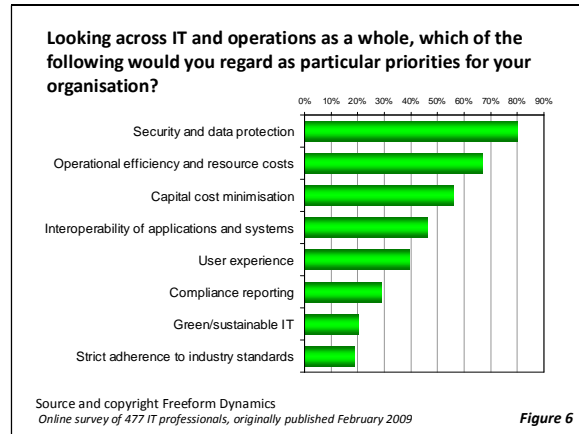
Figure 6

Picking up on another observation from this last chart, the relatively low level of emphasis placed on compliance with industry standards might surprise some people. Surely strict adherence to officially ratified standards in a corporate IT context should help with interoperability, as well as being a good thing in general? This is not necessarily the case, as we see in the next section.

Industry standards in perspective

Firstly, let's be clear that the relatively low priority of strict adherence to industry standards among mainstream IT professionals shown in the charts above, doesn't mean that such standards are unimportant. It is well understood for example, that we probably wouldn't have a telecommunications industry if it weren't for a standards-centric approach. Furthermore, without appropriate standards, organisations would not be able to benefit from the commoditisation that has driven down costs and increased choice around PC's, servers, networking equipment and so on. At an industry level, appropriate standards are essential in the context of technology and communications used within the mass market, and indeed any area requiring large-scale production or deployment.

In many aspects of corporate IT, however, neither vendors nor customers are typically willing to wait for relevant standards to emerge and be ratified, or existing standards to be updated, before selling or adopting new and innovative solutions. Behind this is the fact that standards rarely (if ever) catch up with innovation (Figure 7).This is in no small part down to the length of time standards bodies need to undertake the review and ratification process, together with any
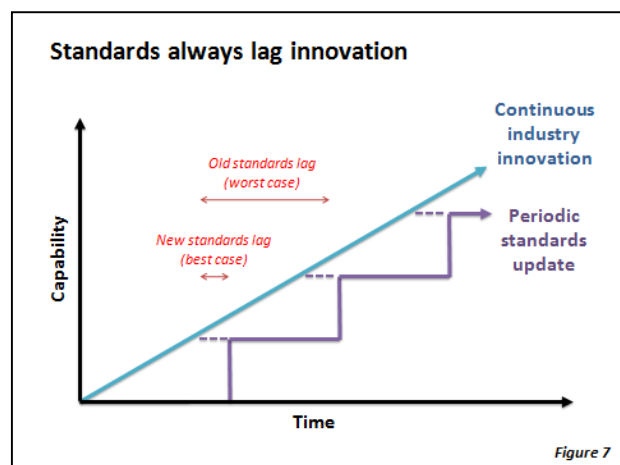

Figure 7

consultation required along the way.

We can debate the rights and wrongs of this fact, but that is how it has always been. In the early 1990's for example, financial services companies didn't hold off using relational database management systems (RDBMS) with embedded performance features such as stored procedures and triggers, even though the SQL standards didn't yet deal with them. There were business benefits to be gained from using the latest developments in what was a highly dynamic front office environment, and that trumped any academic notion of standards compliance.

Over the years, we have seen similar behaviour time and time again. More up-to-date examples include the use of service oriented architecture (SOA) in a business to business (B2B) automation context despite a lack of applicable security standards, and acceptance of Java language extensions not covered by the J2EE standard to take advantage of advanced features in application servers. Each time, organisations have been willing to employ non-standard approaches in order to reap the benefits of innovation.

Having said this, major players in the industry do on occasion collaborate proactively with standards bodies (rather than waiting for them to catch up), to develop and ratify leading edge standards supporting the latest innovations. A good example is the work done around Web services, to standardise the way in which systems interoperate with each other at a business function level over a network (e.g. the internet).
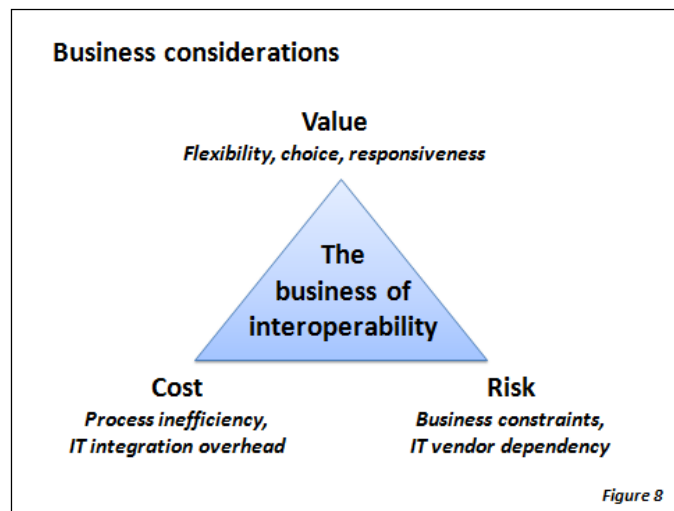
Apart from the lag factor, another reason why de jure standards don't always figure that highly in mainstream IT is because they are too late to the game and the problem has already been solved. Perhaps the worst thing an organisation can do is set too much store around a standards-based solution, when the requirements have already moved on: we saw this for example with the adoption of standards-based public key infrastructures based on ISO standard X.509, which proved too unwieldy for the actual needs of the market.

For more background information and discussion of industry standards, please see Appendix A.

Considering value, cost and risk

Against the above backdrop, we now consider what matters from a business perspective in terms of the following parameters – the value of good interoperability, and the cost and risk consequences of poor interoperability (Figure 8).

From a value perspective, good interoperability translates into choice and flexibility. When a new need arises in the business, or there is a requirement to do something differently, it is easier to either substitute a component within the IT infrastructure, e.g. replace an existing application or function with a more fully featured one, or extend the infrastructure by adding a new component with incremental capability. This leads to an overall increase in responsiveness to changing business requirements, which can have a positive impact on competitiveness, driving market share, maximising revenues, and so on.
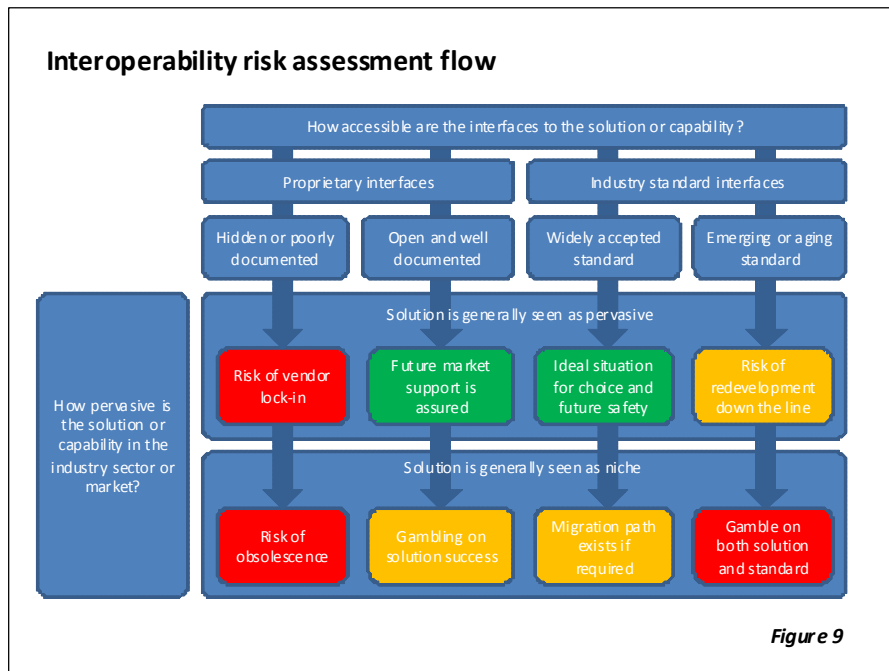

Figure 8

Turning to cost, poor interoperability results in the persistence of systems fragmentation and the kinds of process inefficiency and user productivity issues discussed earlier in this paper. Where integration work is carried out, it will tend to be more costly and time consuming if individual components have not been designed with interoperability in mind.

When it comes to risk, there are two important exposures to consider. The first (being the flipside of the flexibility that comes with good interoperability) involves the constraints to the business that can

arise if solutions lack the ability to interoperate. In addition, the more costly and resource intensive it is to implement change, the less likely change is to occur, which means the business is often stuck with processes and solutions that only partially meet their requirements.

Beyond this, a special kind of constraint often crops up in the form of vendor lock-in. It is all too easy to tie IT infrastructure up in knots through an extensive web of integrations based on proprietary interfaces and data formats. When this occurs, the cost of substitution can become prohibitive, as can the cost of extending capability with anything other than an incumbent's add-on or sister products from the same portfolio. This is fine while the vendor's strategy, approach and capability remains aligned with your environment and needs, but if this changes, or more suitable vendors and offerings emerge in the market place, then lock-in starts to have obvious negative consequences.

When making or reviewing investment decisions around technology, it is therefore important to take interoperability considerations into account. These usually boil down to how well interfaces and formats are

Interoperability risk assessment flow

How accessible are the interfaces to the solution or capability?			
Proprietary interfaces		Industry standard interfaces	
Hidden or poorly documented	Open and well documented	Widely accepted standard	Emerging or aging standard

	Solution is generally seen as pervasive			
How pervasive is the solution or capability in the industry sector or market?	Risk of vendor lock-in	Future market support is assured	Ideal situation for choice and future safety	Risk of redevelopment down the line
	Solution is generally seen as niche			
	Risk of obsolescence	Gambling on solution success	Migration path exists if required	Gamble on both solution and standard

Figure 9

documented and how accessible they are, together with the market penetration or pervasiveness of the solution being considered (Figure 9).

Interoperability and the latest market trends

While the discussion so far is relatively timeless, in that the principles covered will remain valid for a long time into the future, there are some current market trends that are important to consider from an interoperability perspective.

Integrated stack propositions

The first is the increasing tendency for vendors and their partners to define 'integrated stacks', in which various platform components – servers, storage, networking, software, tools, etc – are delivered in a tightly coupled manner. Some have likened this to the idea of a platform 'appliance', which in turn is based on the concept of 'black box' delivery – that is, from the outside in, everything should just work with the minimum of intervention.

The upside of this practice is that components are delivered with all of the elements pre integrated to work together optimally. This can potentially save customers a lot of time and expense, as even with open interfaces, effort is usually still required to assemble and test the platform or solution.

This 'acceleration to value' spirit is clearly behind quite a few of these propositions, but it is important to be wary of vendors stepping over the mark. If the message coming across is that the only way of getting the most out of the individual components included in the package is to use them together, then this should raise a flag from an interoperability perspective. There is a big difference, for example, between saying that a particular RDBMS comes pre-optimised to run on a specific type of hardware when delivered as an integrated solution, and saying that the RDMBS will never run as well on alternative hardware, regardless of the optimisation effort you put in.

At the time of writing, the latest integrated stack propositions from the likes of Oracle and Cisco were unproven in terms of market acceptance. Prior to this however, Freeform Dynamics conducted some research into similar concepts around application platforms. The idea was to investigate the perceived relevance and appeal of defining a consistent set of platform components (e.g. to deal with application serving, web serving, database management, transaction management, identity management, security, and so on) that would collectively act as a standard foundation for developing and deploying applications.

The results showed that around half of the respondents saw the logic and relevance in the application platform idea, and quite a few benefits were acknowledged. This still left a significant proportion however, who were not bought into the concept of an integrated stack (Figures 10 and 11).
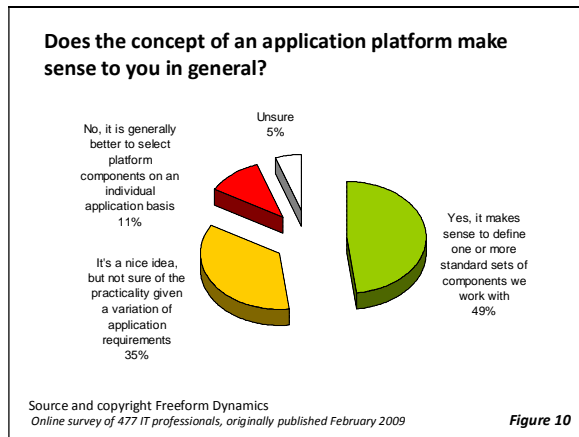

Source and copyright Freeform Dynamics
Online survey of 477 IT professionals, originally published February 2009   **Figure 10**

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Online survey of 477 IT professionals, originally published February 2009   **Figure 11**
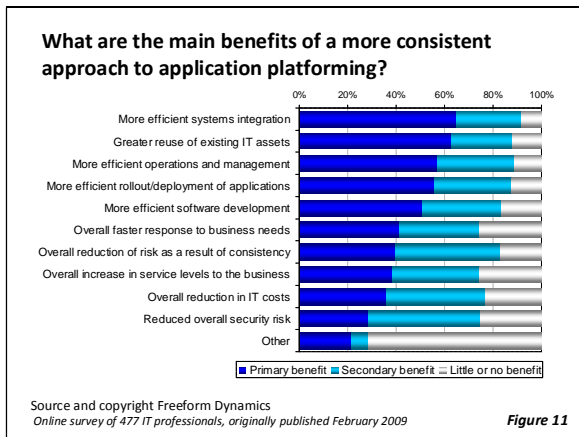
Based on these findings, it would be reasonable to assume a similar split in opinion with regard to platform offerings lower down the stack that embrace the hardware and networking layer. Even where such solutions have an appeal, they are unlikely to solve all platform needs, especially in a larger scale environment, and there are times when IT specialists may wish to 'lift the cover' and deal with components individually for special integration and optimisation requirements. We would therefore urge attention to be paid to component-level interoperability in all cases, and be highly suspicious of proprietary 'hard-wiring' at any level.

Cloud computing

Much IT industry attention is currently being given to 'cloud computing'. While the definition of this term is a little ambiguous (See Appendix B), particularly relevant to the interoperability discussion is that many of the defined services are intended to work together, either with each other, or between hosted services and infrastructure/software running on premise (Figure 12).

For example, consider the category of business application services (also referred to as Software as a Service or SaaS). Like traditional systems, few such services will be deployable in isolation, which means integration will be necessary with on-site systems and/or services from other providers.

Figure 12

Meanwhile, in the domain of utility services, we can consider 'over-spill' scenarios in which workloads need to be shifted or extended onto virtual infrastructure in a service provider domain to handle peak demand. Similarly, in the context of hosted collaboration, we can look at where email boxes and workspaces
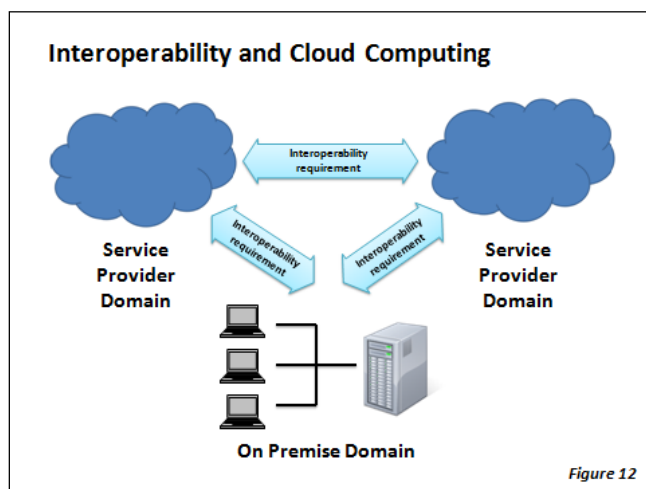
are created in the service provider environment to deal with a sudden expansion in the user base (e.g. through acquisition) or some other rapid growth in demand.

In scenarios such as these, the issue of operational interoperability between local and hosted facilities comes into sharp focus. This raises the question of what expectations customers should have of vendors in terms of interoperability. While this can mean different things depending on the type of cloud computing being considered, the starting point for any such discussions concerns the data itself. From a decision making standpoint, the integration needs between online and local systems are not that different to traditional integration. However, as well as the necessary due diligence in terms of outsourcing a service, organisations also need to take into account the constraints of the network connection with the hosting provider.

In practical terms, these constraints include the bandwidth available and the latency of the connection. While these may not appear directly related to interoperability, they may dictate requirements on the kind of interface required – for example whether a connection is to be synchronous involving small amounts of data, or asynchronous involving larger amounts of data. Such constraints may be less of an issue if data integration is required between hosting providers, who will generally have access to higher levels of bandwidth.

Thought also needs to be given to what happens in failure situations. Many hosted services providers are starting to prioritise matters of data privacy and security, availability and so on, but some have been slow off the mark which has inevitably raised concerns about whether data will be fully protected, or indeed, retrievable should something go wrong – for example, due to a system outage, a natural disaster or indeed the provider going out of business.

Organisations are therefore faced with the need to move information out of a hosted service (and potentially into another) as straightforwardly as possible – clearly, any such migration activity will be dependent on having accessible interfaces to the data. Keep in mind however, that the question of data integration is more complex than just thinking about records in a database, or files in a content store. Two other kinds of data also need to be considered:

- Metadata, which contains specific information about the data being stored, for example database table information, or tags for unstructured content files.

- Configuration data, such as policy rules, document templates, user groups, custom search fields and other customisations that may be built on top of a 'vanilla' service to make it specific to an organisation's needs.

Both kinds of data can accumulate over time. More importantly however, uncontrolled use of such data may result in an organisation being locked into a service if the data cannot be migrated from one service provider to another, whether or not the core data is using nominally 'open' standards.

On the subject of lock-in, we also need to consider integration requirements from a software development perspective. While hosted services offer more flexibility to developers, it is important that this does not come at the cost of lock-in to one specific service down the line. Hence we have the joint interoperability criteria of both open interfaces based on broadly accepted languages, plus data portability to enable migration both into and out of online applications.

Cloud computing is a work in progress, and there is still much to be done. Beyond the data itself for example, we have interoperability questions around integration with in-house security capabilities, encryption key management and identity management as well as systems management and monitoring. For a cloud-based service to hold its own compared to in-house systems, it will have to work as an integral part of the IT environment as a whole.

While vendors are tackling these areas, no company has a monopoly on all the answers. In the meantime, what is clear is that interoperability is fundamental to success with cloud computing.

Unified Communications

An area in which many organisations are investing at the moment is improvement to the communication and collaboration facilities used within the workforce, with a growing interest in unified communications in particular. Whichever way you cut this, it is impossible to avoid a big focus on interoperability, either to do with making sure that the various mechanisms used

internally (email, instant messaging, telephony, audio conferencing, web conferencing, video conferencing, etc) all work together seamlessly, or with ensuring smooth operation with the outside world.

As a word of warning here, there are many vendors offering turn-key unified comms solutions, and when looking at these, it is important to bear in mind the principles discussed previously in relation to integrated stacks as the considerations are very similar, as are the implications in terms of constraints, vendor lock-in, etc.

Consumerisation of IT

As a result of the bleed-over of ideas, technologies, web based services, and user expectations from the consumer market into the business domain, IT departments increasingly have to consider a new set of issues. This includes dealing with equipment, software and online applications they may not have had a hand in deploying, i.e. capabilities introduced directly by users independently of IT. Whether it's mobile devices, alternative non-Windows desktop solutions, or social media, interoperability with the corporate IT landscape is a big consideration when looking at how to manage this trend.

Service-centric IT delivery

The continued efforts within many organisations to better align IT activity with the needs of the business often leads to a more service centric approach to IT delivery. Whether you call this Business Service Management (BSM) or IT Business Alignment (ITBA), the basic idea is to focus on service levels around the capability delivered to users rather than the performance of components used to deliver that capability.

Beyond the obvious need for end-to-end interoperability across everything required to deliver a business service, service-centric IT delivery has also led to a requirement for more interoperability in the management layer. Efficient end-to-end troubleshooting and diagnostics, for example, is pretty hard if the tools used to monitor and manage the network, physical servers, virtual servers, database management systems, desktops, etc, will not exchange information freely with each other.

Business-to-business Trading

Whether in the supply chain or demand chain context, both information and transactions are increasingly being passed electronically between trading partners and their collective customer bases. Standardisation of real-time communication mechanisms, as well as formats for information exchanged, is critical here, as is the openness of systems on either side of the B2B boundary. On a specific point, ease of interoperability is particularly important when large organisations are trying to encourage more electronic automation with smaller business partners who don't have the resources to develop solutions around proprietary interfaces, or pay for such development to be done by a third party.

We are sure that many other things are going on within your organisation to which the interoperability discussion is relevant, which further underlines the point that it is so fundamental.

Defining your interoperability requirements

We hope the discussion so far will have helped to crystallise some of your thoughts around the way in which the interoperability question impacts businesses in general, and relates to some of the common trends and activities we see at the moment within the business community. This only starts to matter, however, when you apply it to your own environment and needs.

When doing this, the golden rule is to avoid generalisation and dogma. It is generally not appropriate, for example, to get overly obsessed with strict compliance with official industry standards across the board. In some cases, this will be important, in some it will be irrelevant and in others, it may even be a mistake, e.g. where standards are unproven, aging and/or a more relevant de facto or proprietary standard will achieve the business goal better.

There is then the question of how tightly things need to be integrated, and here too it is important to be objective and focus on the business need, as requirements will vary across different aspects of

IT and business operations, and even between different scenarios in which the same or similar technology is used.

There are two important dimensions here (Figure 13). The first concerns whether integration needs to be synchronous or asynchronous. If the former, then the requirement is likely to revolve around real time interfaces between systems, in which case pre-integration in the 'plug and play' sense and/or open Application Programming Interfaces (APIs) to do with messaging, service/function calling between systems, and transaction management are going to be the focus. If we are talking about a need for asynchronous interoperability, the focus is more likely to be on file formats and mechanisms to facilitate storage, access and batch transport.

The other dimension is the degree to which interaction needs to be optimised. In a real-time application integration scenario, for example, the degree of optimisation might be dictated by performance criteria to do with the volume of traffic going back and forth between systems. An asynchronous example might be concerned with the format employed in relation to office documents. You may opt to use a different format for when the requirement is exchanging basic documents with as wide an audience as possible, but another format supporting advanced application features when the faithfulness of visual presentation is key or embedded functionality (e.g. in the form of macros) is important.

The point is that there are very few universal rights or wrongs when it comes to interoperability, apart from giving due consideration to the principles and practicalities we have discussed in this paper. Indeed if you are forcing a single approach, you are probably failing to meet needs optimally in some areas, and wasting time and resource on overkill solutions in others. To illustrate this, we have provided some examples of how specific interoperability requirements might vary according to the two parameters we have highlighted in Figure 13.
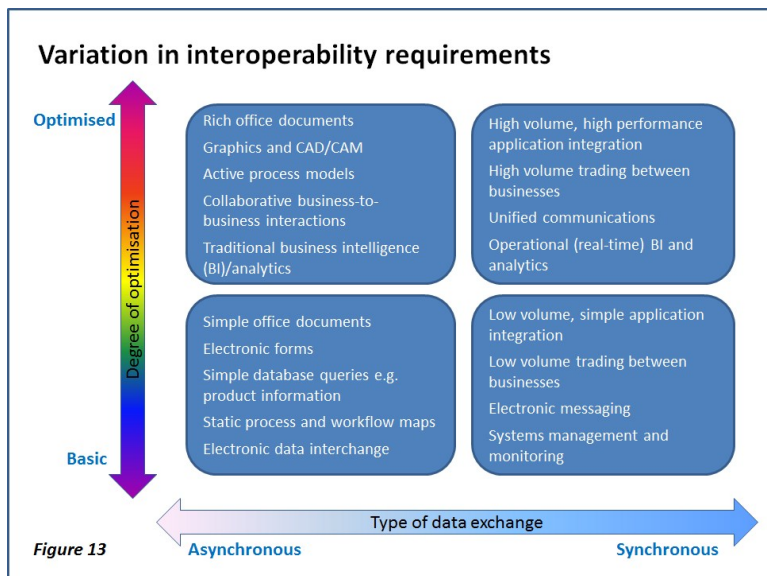

Figure 13

Conclusion

Today's complex and inter-dependent IT environments are increasingly crossing organisational boundaries between businesses, their trading partners, and service providers. As a result, the ease with which solutions and services can interoperate is a major consideration that is only going to grow in importance over time.

Interoperability is a target that moves as quickly as the IT industry itself. Throughout the history of IT we have seen official standards being formed, adopted and then falling by the wayside. Partnerships and alliances are created around de facto standards which may later become official – collaboration between IBM, Oracle and Sun Microsystems around the programming language Java is a classic example of this. Today things are no different, as illustrated by the cross-licensing and interoperability agreements between Microsoft and Novell with respect to interoperability between Windows and Linux, or the raft of mobile players supporting Adobe's Open Screen Project initiative.

Such alliances are driven by multiple factors, of which a drive to maximise immediate value to end-user companies is only one. The IT industry is a highly competitive market, and given that vested interests and industry agendas are an inevitable part, it is very important that organisations ensure that their own business and technical requirements are the primary focus when considering such questions as interoperability.

With this in mind, we would make the following recommendations:

- Be clear on what interoperability means for your own organisation. The answer will depend upon many criteria including the size of your business, the approach to IT and whether it is seen as strategic or a means to an end, the amount of dependency on existing and legacy systems, compliance and regulatory requirements and so on. Starting with a definition of interoperability on your terms will give you a much firmer starting point to understand how best to deal with the challenges you face.

- Review your existing IT and services landscape from an interoperability perspective and highlight any areas of potential risk and constraint in line with the principles we have discussed. The aim of this is to identify weaknesses and vulnerabilities before they turn into real problems, though it has to be said that in the majority of cases, such interoperability problems will almost certainly turn up.

- Ensure that applicable interoperability principles are worked into planning and procurement to ensure that new technology and approaches brought into the business are 'interoperability friendly'. These principles should translate into expectations on the vendors and service providers you use, which should be built into your due diligence activities during procurement.

If there is one thing our analysis of this area tells us, it is that when conducting all such activities, it is most important to avoid being distracted by the politics of advocacy groups or the rhetoric of IT vendors as they claim their way is right and everyone else's is wrong. The truth is that there is little difference nowadays between the degree to which all major vendors mix proprietary and open technologies, regardless of what they say about themselves or their competition.

The IT platforms upon which we all depend will continue to evolve, and while it is very difficult to predict what is coming, future-safety remains a factor upon which all IT decisions depend. Meanwhile, the debate will continue about which vendors and products are more interoperable than others. Against this background, it can be tough to tell signal from noise. With interoperability, the trick is to stay focussed on the needs of your organisation, in an objective, business-focussed manner. By doing so, you can ensure the best possible balance between maximising the value of IT to your business, while minimising the costs and risks both now and in the future.

Further Reading

The research data presented in this paper, and some of the associated insights, were originally published in the following reports, which are all freely downloadable via the links provided.

Server Virtualisation in Context (September 2009)
Rationalising and optimising your x86 server estate
http://www.freeformdynamics.com/fullarticle.asp?aid=789

BPM: Lessons from the Real World (October 2008)
Practical ideas to apply to your organisation
http://www.freeformdynamics.com/fullarticle.asp?aid=452

Application Platforms (February 2009)
The state of play
http://www.freeformdynamics.com/fullarticle.asp?aid=593

IT on the front foot (April 2008)
Sourcing, architecture and the progressive IT organisation
http://www.freeformdynamics.com/fullarticle.asp?aid=318

IT Management Checkpoint (January 2008)
The Next 5 Years
http://www.freeformdynamics.com/fullarticle.asp?aid=129

Please see www.freeformdynamics.com for a wide range of other papers, reports and research notes on the effective use of IT in a business context.

Appendix A - Beyond 'official' standards

Across this document we refer to standards, but it is important to recognise that official standards are not the only form of standard in use. We also have de facto standards and proprietary standards, all of which are discussed below.

Official standards

Official standards need to be ratified by a formally recognised standards body such as:

- International Organisation for Standardisation (ISO)
- National Institute of Standards and Technology (NIST)
- Institute of Electrical and Electronics Engineers (IEEE)
- World Wide Web Consortium (W3C)
- European Computer Manufacturers Association (ECMA)

The standards that emerge from such bodies (there are many more of them than the ones we have listed here) are often referred to as *'de jure'*, which basically means they are 'official' at an industry level (the term originates from the Latin expression for 'by law').

De facto standards

'Unofficial' or 'de facto' standards have not been ratified by a standards body, but have been widely accepted across the industry as the way things are done. The term originates from the Latin for 'by [the] fact'. Examples include the TCP/IP networking protocol, the Microsoft Word DOC format, and the AutoCAD DXF format. What these and other de facto standards have in common is that they are pervasive in nature, hence they provide a common foundation for communication between systems and, indeed, users and businesses.

In some cases, de facto standards have been embraced by standards bodies and become de jure. Examples here include Adobe's 'Portable Document Format' (PDF) and even 'HyperText Markup Language' (HTML). This is clearly useful for organisations such as those in certain parts of the public sector who place more emphasis on standards compliance than private sector organisations. It also, however, ensures a level playing field across the industry as de facto standards often originate from, and indeed are often controlled by, a particular vendor who arguably enjoys more market leverage as a result.

Proprietary standards

Proprietary standards are published in an open and well-documented manner by specific vendors to allow others to interoperate with their solution or environment. Of course we can only consider them standards if the technology concerned is pervasive enough to matter to a large audience and if other players in the industry have acknowledged and embraced them.

Such standards have happened most frequently around solutions that have acquired a large market share over time such as certain email offerings like Microsoft Exchange and IBM Lotus/Domino, and widely adopted ERP systems from the likes of SAP and Oracle. While there is a general trend towards offering alternative industry standard mechanisms for integration in most cases, the proprietary standards often remain as they provide a greater degree of functionality and control.

Note that the distinction between de facto and proprietary is often difficult to make, but essentially comes down to whether the standard is significantly employed independently of the originating vendor's technology.

Appendix B – Cloud computing models

The current level of interest in the phrase 'cloud computing' has given rise to a plethora of different service offerings, some of which have been around for some time, and some of which are more recent. These are summarised in Table 1 below.

Table 1 **Hosted service offerings commonly associated with cloud computing**	
Business application services	It is in this area that the term 'Software as a Service' (SaaS) was originally coined. Services at this level are typically focused on the delivery of complete business functionality, e.g. CRM, ERP, etc.
Hosted productivity tools	Services here are more concerned with horizontal capability ranging from desktop suites for end users, through to modelling, development and project management tools for analysts and developers.
Hosted comms/collaboration	Spearheaded initially by hosted email and web conferencing, the number of services offerings in this area has exploded to include full unified communications and/or social media (directories, blogs, wikis, etc).
Trading community services	As supply chain automation has gathered momentum in some industry sectors, services have emerged aimed at facilitating the way in which customers and suppliers collaborate and transact electronically.
Plug-in services	A myriad of services exist which do not provide complete business functionality but 'plug into' existing applications to enhance or extend them. Examples include everything from mapping to credit checking.
Application platform services	As an alternative to consuming pre-built services from external providers, application platform services provide development and runtime environments allowing custom applications to be built and hosted online.
Utility services	Sometimes, you have your software, but simply want somewhere for it to run and store its data. This is the realm of utility services, which are essentially about providing raw compute and storage resources.
Operational services	This often overlooked but highly important category is where we find services concerned with online backup, archiving, security (e.g. email filtering), etc, and even full blown monitoring and management tools.

With cloud computing, it is very important to recognise that the term itself means different things to different people. We have conducted some specific research into this fact, which we summarise in a brief report, "But is that really Cloud Computing?" available at the link below:

http://www.freeformdynamics.com/fullarticle.asp?aid=1068

About Freeform Dynamics

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

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

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