

# theARC magazine

ISSUE 02

SOFTWARE + SERVICES

## DEFINING THE ARCHITECTURE OF S+S

The structure behind the cloud

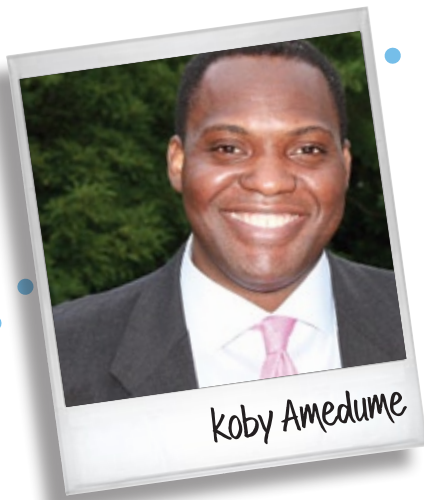
### SECURITY AND YOUR DATA

Security, identity, privacy and your data from a S+S perspective

### SUSTAINABILITY

What is Microsoft's answer to the ongoing green debate

**Microsoft**<sup>®</sup>

## Welcome to issue 02

This magazine has been put together to showcase the Microsoft Software + Services (S+S) strategy from an architectural perspective and will help explain the fundamental architectural considerations and impact that software plus services will have.

Microsoft's investments in S+S are framed by three core principles. Firstly, experiences should span beyond a single device. In our world of ever-increasing devices, choice in the right computing power in the right place at the right time is paramount. User experience environments that span seamlessly from the browser, to the PC, to the mobile and the console need to be brought together to provide flexible yet unified experiences.

Secondly, infrastructure and solutions should extend from the server to the cloud. Cloud services developed hand-in-hand with on-premise server counterparts will deliver much needed choice to enterprise customers — enabling flexibility in developing, scaling, operating and migrating systems that are distributed between the cloud and the enterprise datacentre.

And lastly, tightly coupled systems should give way to federations of cooperating systems and loosely coupled compositions. With the right transparency, standards, identity and interoperability, these small pieces of code

loosely joined help developers build new applications and services out of base components — enabling agile and cost-effective development.

Software + Services also recognizes that for most companies the ideal way to build IT infrastructure is to find the right balance of applications that are run and managed within the organisation, and applications that are run and managed in the cloud.

Traditional approaches to building technology infrastructure and delivering computing capabilities make it difficult and expensive to adjust to these new realities. Microsoft's progressive shift toward S+S is reshaping and transforming our existing offerings — and informing our roadmap for the future.

Take a look ahead at what a future of connected software and services could bring. Applications and services that once stood apart become far more valuable when taken together. Business moves faster, ideas flow more freely and people grow more deeply connected.

In Issue Two of The Arc, we aim to show you the implications for S+S and the effects it has around security, interoperability and services by talking to key figures and gaining an insight of how things might play out. We also feature an interview with Mark Taylor, the man charged with leading the S+S push within the UK.

### Koby Amedume

Platform Marketing Lead, Developer Platform Evangelism Group, Microsoft UK

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# Software + Services: The Architecture

**A**s we glance back in time it is possible to see a number of key trends, or ages, in computing - from the mainframe that gave way to the PC that once networked provided models to share information and data, to the emergence of the internet itself and the ability to share information between organisations. But what is the next wave?

Today, we are witnessing a great transition in computing, driven through the broad availability of the internet, the increased bandwidth to share data, and the proliferation of cheaper connected devices from the desktop to the mobile phone.

Indeed, it is easy to get lost in this new wave given the deafening buzz that is out there. However, several concepts are starting to emerge from the rest: software as a service and service delivery; Web 2.0 and user experience; service orientated architecture and service composition; as well as the cloud and service platforms.

Once we combine these concepts we can start to paint a picture of what's happening: the era of the connected device and of software plus services (S+S).

S+S draws together these concepts and in so doing provides a definition for Microsoft's technical strategy for this new dawn.

To understand S+S it is best to look at an example. As we know Exchange is available as an installed server application within the enterprise, but it is also available as a hosted platform either through a hosting partner or direct from Microsoft datacentres as part of its online suite of services. This is what we describe as a 'finished' service.

The second characteristic of S+S is the client or user experience tier. In this case Outlook provides the classic desktop application for interacting with Exchange, offering a rich user experience with key features such as local storage and offline capabilities. When a user is away from

their machine, Outlook WA offers a thin client browser based experience allowing access from any machine connected to the Net. Then there is mobile, providing capability to access from a mobile device once more utilising its resources in supporting local storage and offline support. Finally for Exchange there is voice to access your inbox and when used in conjunction with unified communications, you can access your voice data too. This describes the multi-headed feature of S+S and its key feature of synchronisation across all heads.

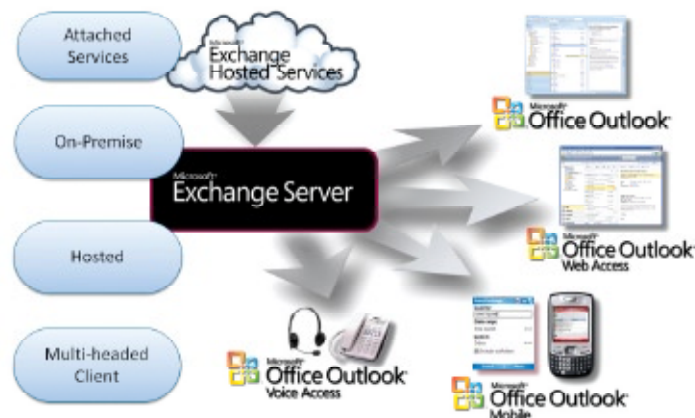
A third S+S characteristic is that of attached services which can be viewed as extensions to the core finished service. These would not make sense existing in isolation, but are discrete in that they can be located independently of the finished service itself. For exchange this comprises hosted Exchange services such as filtering, archive, continuity & encryption.

When you pull all this together, it goes some way to describing the new world of S+S.

The first tier is our experience tier, the PC on your desk or the phone in your pocket. Software here shows a richness of interface, local storage, offline support and synchronicity - all to varying degrees in relation to their context.

This first tier, of course, is our experience tier and it's all about you. The second is the enterprise tier, the back-end systems hosting our business infrastructure and our business solutions. The scale of this is roughly the size of the enterprise and serving this is really the design centre of today's server architectures and systems management architectures, and of most major enterprise datacentres.

The third is the Web tier - externally facing systems serving your customers, your prospects and potentially people the world over. Scale here is the size of the Web and this tier requires computation, storage,



## AN EXCHANGE EXAMPLE

networking, and a broad set of high-level services designed explicitly to scale infinitely, on-demand and on a global scale.

High-scale internet services infrastructure form the new tier in computing architecture. In a S+S world, finished and attached services sit across these tiers, providing instances that are deployable as traditional on-premise software or consumable as remotely hosted internet based services that are managed independently or by Microsoft itself.

The final element of S+S yet to be discussed is that of platform or 'building block' services. These share a similar trait to that of 'finished' and 'attached' in that these two can exist both on premise (UX & Ent tier) or off-premise. Perhaps the best example here in the enterprise tier is that of the .NET framework itself which forms the fundamental building blocks of software. In the web tier the reach of .NET is extended through Windows Azure, Microsoft's own 'cloud' computing platform.

**For more on the cloud see edition four...**

## JARGON...?

### Software Plus Services (S+S)

The idea of combining hosted services with locally running software to provide a richer, better solution for users.

### Cloud computing

The use of computer technology with resources provided as a service over the Internet relieving users of the need for knowledge, expertise or control of the products.






## Software + Services

Right now, Mark Taylor is on a mission. He is taking his team on a journey to spread the word that Software Plus Services will give people the widest choices and the ability to move at different speeds. It's the future, as he tells Mark Dye

**A**s director of Developer and Platform Evangelism at Microsoft UK, Mark Taylor has a job on his hands. Accountable for securing the future of the Microsoft Platform by demonstrating and articulating its value proposition, he and his team must successfully deliver this vision on a number of fronts.

"The best way to think of the role is as the leader of a team of people who pull together a variety of disciplines between us," he says, "a combination of technologists and marketers joining together to evangelise and demonstrate how our platform creates value."

If accountability is the order of the day, then Taylor has his plate full. Not only is he responsible for the successful 'landing' of the above, but he is the 'lead' for Microsoft's software plus services (S+S) push into the UK market, required to influence the shape the strategy takes in this space, helping clients and partners realise the benefits of the strategy.

Today, Taylor recognises four key areas. These are S+S, security, standards and interoperability, and environmental sustainability.

To me this seems like a lot and yet Taylor is not fazed. He has his team and claims the list is 'not a bad one'.

Right now, Taylor says he is seeing a variety of trends emerging. Datacentres

# Leader of The Pack

## A MAN FOR FOUR SEASONS

are becoming more agile, broadband penetration and speeds are on the up, and social networking technologies are becoming more pervasive. All this and a wealth of device types plus the ability to run applications and host data on traditional customer or partner sites, have it hosted somewhere on the net or perhaps a combination of the two approaches, is giving enterprises options.

“A world of choice based on what a client or partner wants to optimise for,” he says.

Within all this, factors that remain key to all approaches are security, interoperable standards and environment sustainability.

Taylor is sure people will only place applications or data somewhere outside their own datacentres if they trust that company one hundred percent and if they believe that security is matched to their needs. Enterprises must also be confident that they will not be locked into that provider, he says.

But just what are the primary implications for the IT industry and software plus services, and are they indeed the same?

“The plus in software plus services simply means choice,” he says.

This means a customer can choose to consume their applications and data as a service from another party, to run their applications from their own sites and hold their data on these, or use both approach-

es depending on the requirements of each application.

“For the IT Industry we need to make sure that if clients use the service approach they realise economies for scale from doing so,” adds Taylor. “Data-centres that run the applications and hold the data need to be built in an agile fashion, in a way which takes due regard of the need to show strong leadership in carbon footprint containment, sited in areas that are acceptable to our clients and partners, driving a strong partner eco-system exactly as we have today.”

The key message here is one of collaboration as far as Taylor is concerned. Indeed, this should be at the heart of forward thinking providers and enterprises alike as they look to rein in costs by crossing divides that have held firm for so many years.

“The IT Industry needs to work together to tackle the problems that arise as we move to a world where we need interoperability between different service providers,” he adds, citing identity management as a key cross-industry problem that companies are already working together on.

“It is an evolutionary step,” he explains. “A step that allows clients choice and the ability to move at different speeds. Some clients may not move away from on premise software. Some clients may only want services and no on-premise software.

“I believe that the majority of clients will want a hybrid (S+S) and the ability to move at a pace which matches their exact needs across their application portfolio,” he adds.

How quickly this transformation occurs will depend on several factors, but Taylor suggests that during the next five years numerous clients and partners will move to world of software plus services. However, in the early phase many of these will use what is traditionally called software-as-a-service (SaaS) such as Microsoft’s own Business Productivity Online Services Suite.

“Over time though, driven by economies of scale and agility, I believe that many clients will look to a combination of software on-premise working in combination with services consumed from a service provider. It will not be either software on-premise or services consumed,” he adds.



### JARGON...?

#### SaaS

Where an application is hosted as a service provided to customers via the Internet.

# A Question of Trust

## Security +

Identity, data and the way in which we guard these elements represents one of the biggest headaches to businesses everywhere in a landscape that is constantly changing.

What are the security implications for software plus services?

**T**he spate of data losses and insider abuse of privileged access to information has highlighted the problems associated with the acquisition and storage of personal information. Indeed, enterprises everywhere have been guilty of hoarding data in the hope that one day it might just prove useful.

Thankfully, those days have passed. People are realising that data can be a toxic liability and consequently a serious business risk. As a result, we're seeing some positive moves towards data minimisation and the use of principles of minimal disclosure in place of the cavalier and costly attitudes of the past. However, one of the largest remaining obstacles is the poor identity infrastructure across the Internet and some of the services it hosts, including email and websites.

"It still remains almost impossible for us to prove who we are when we are online and, worse, it remains impossible for us to prove that the other party or parties we are dealing with are who they say they are," explains Jerry Fishenden, national technology officer, Microsoft UK.

This, he says, is why phishing, pharming and online identity-related fraud continue to be one of the most successful growth vectors in the economy.

Other key concerns raised tend to be about where data is being held, portability, and the type of identity, security and privacy regime that is in place to ensure a higher standard of protection around personal information than in the past.

"If cloud computing and software plus services are to become trusted parts of the overall ecosystem, we have to find ways of tackling these issues," he adds.

Businesses and governments who take best advantage of the software plus services (S+S) computing models will be able to both improve operational efficiencies and improve the quality of their services, but this will require a common framework around issues such as identity to ensure that different service providers and users can use them in a trusted and secure way.

In very simplistic terms, the S+S model may allow the IT security professional to better contain and control the flow of information," adds Edward Gibson, chief security advisor, Microsoft UK. "If one considers the S+S model as a third party hosting mechanism this may enable a company to reduce infrastructure previously allocated to the internal IT functions."

However, Gibson says this would require considerable internal review and thought, because once gone, it is much more difficult to re-establish IT functions to their former level.

"A business must know what proprietary information and assets it has before it can decide the best methods to secure and protect it," he adds. "I continue to see even the largest of companies failing to take inventory of what they have, much less deciding what steps to take to secure it. Once that is done, the business must know why it is even considering S+S, 'in the cloud', or 3d party hosting models."

At a policy level, Fishenden believes that one of the biggest challenges of S+S is the way it demands a fundamental rethink of our ideas about governance, architecture and procurement of IT.

Indeed, enterprise computing has generally operated on the model of specifying, procuring and running everything

in-house, or of reaching agreement with an outsourced partner to operate those services on its behalf.

S+S, on the other hand, opens up new ways of thinking about how IT is operated, how it is architected - locally or in the cloud - and the ways in which it is procured.

That, says Fishenden, can prove a challenge to the vested interests of some IT operations.

"In the current economic environment, S+S is going to provide a distinct advantage to those enterprises and governments who understand the changes they need to make," he adds. "Since customers do not own the cloud infrastructure it helps avoid capital expenditure, enabling them instead to use resources as a service. They pay only for what they actually use."

Fishenden believes there is a choice of both subscription or 'on-demand' billing emerging that gives huge potential, even for new start-ups who can host their application services in the cloud with third party services and scale dynamically as their business grows.

"They can concentrate on their core business and their unique application rather than getting distracted into worrying about the management and maintenance of data centres," he adds. "The ability to share computer resources across many users helps to improve utilisation rates, enabling cost reductions at the same time as increasing the speed of application development."

Yet to succeed in enabling change to happen, cloud computing providers need to collectively be aware of key issues like charging models, data portability, openly



documented interfaces and protocols, and common standards of security, privacy and identity, he says.

“When it gets down to where the rubber meets the road,” says Gibson, “business people, irrespective of whether micro- or multi-national and everyone in between, simply want to know the information they want to keep safe is in fact being kept safe.”

Gibson says this can be tough as enterprises find it difficult to know when they’ve achieved this level of security.

“Do decision-makers understand and recognize their residual risk even after taking steps to achieve what they see as being ‘best practice?’” he says. “Not only may the answer be ‘no’, but a surprising percentage may not have even understood that question.”

One of the main issues here which is certainly true is that IT will never be static, creating problems for vendors and users alike. Innovation and developments in a constantly evolving space mean that businesses and governments need to keep a close eye on things to ensure continued optimisation of the technology that supports their services.

“Like any other part of a successful business service, IT is not about a periodic, ‘big bang’ investment that is then left to lie fallow for a number of years before being revisited,” adds Fishenden. “It is about a continual and reciprocal relationship between the business and the technology, with both constantly being reviewed and refined to mutual benefit – all, of course, with the end goal of maximising the benefits to the users of those services, namely us, as citizens or customers.”



# Together

## Initiatives

Interoperability is seen as the key to succeeding with services by those in Redmond. The Arc spoke to one of the men involved on the front line

**H**aving recently launched an interoperability Initiative on a worldwide scale, Microsoft has been keen to demonstrate how its interoperability capabilities can support customer needs, especially in light of the current economic storm.

The hope in Redmond is that such a move will enable Microsoft to change people's perceptions of the way in which it goes about its business, allowing the company to demonstrate how its recent moves have been along these lines anyway.

As Giampiero Nanni, director of interoperability, Microsoft UK, stresses, it's time for the company to provide evidence of a collaborative, pragmatic, customer and partner-oriented approach to all parties.

"Microsoft is committed to standards, and this is proved by our proactive and constructive participation to about 150 standard bodies around the world, where we proactively provide support, endorsement and expertise," he explains. "On the other hand we see standards as one important way to achieve interoperability, but we also believe that other approaches can be viable to customers' interoperability needs, depending on their circumstances."

In Feb 2008 Microsoft announced its interoperability principles. These represent a commitment to a proactive interoperable approach to product design for its six high-volume products in terms of open engagement with the community, data portability, open connections, and standards support. In this case tens of thousands pages of technical documentation on these products were made available to the community, according to Nanni.

He is also quick to point out a renewed attitude towards community cooperation in order to achieve its main objective of servicing customer needs. Not just customers

and partners, but also competitors and the OSS community, he says.

"In this context we believe that vendor collaboration is vital and represents the way forward in an IT landscape characterized by heterogeneity."

In a move further designed to show solidarity, Microsoft is also providing access to its technology through the licensing of patents, copyright, trademarks and other IP rights, giving other vendors the opportunity to develop their solutions on its platform.

"Microsoft also spends over \$1.4bn on licensing in the intellectual property of other firms," adds Nanni. Something he views as tangible proof of its business commitment and cooperative attitude towards customer and partner needs.

The company also acknowledges that its customers operate heterogeneous and sometimes very complex IT environments to run their businesses and says that it is committed to create conditions giving them the choice to assemble and operate a set of platforms and software solutions that best suit their wider business needs.

"In other words," says Nanni, "we don't want Microsoft to be, or to be seen as, an inevitable choice for customers. We would like to be chosen for our superior technological value and business benefits."

But if Microsoft is taking this subject seriously now, what does interoperability actually mean to those involved at the coalface?

Interoperability, or 'the connection of people, data and diverse systems', as Nanni refers to it, is a very wide-ranging concept and applies in different ways to diverse audiences in contrasting industries.

Indeed, he believes that Microsoft treats this as a critical asset for customers, intended not only to ensure choice, but also to provide the ability to make diverse

technologies seamlessly work together.

"Technical interoperability however, is only one level of this paradigm, which in turn enables the so called 'semantic interoperability', referring to the seamless flow of information between diverse systems, and 'people interoperability', the ability for different divisions, organisations or government agencies, to cooperate from a business and functional point of view, regardless of technology, standards or location constraints," he explains.

One important example of collaboration cited by Nanni, in this case with a competitor and in a very sensitive area, is the Microsoft-Novell agreement. Over twenty organisations in the UK, both within private and public sectors, have embraced this approach and now run hybrid Microsoft and Linux environments, leveraging virtualisation and interoperability capabilities, and ultimately enjoying peace of mind in conducting their business or providing citizen services.

"Moreover," says Nanni, "Microsoft can count on a vibrant and collaborative partner ecosystem, with an irreplaceable talent when it comes to foster technological innovation and business vision for our customers."

The feeling from Redmond is that these moves will change the way people view Microsoft forever and will have wide reaching implications for the business even if the company still has some way to go in convincing some doubters of this.

"We are confident that we have widespread proof and authoritative advocacy in the different communities to achieve the objective of changing the way Microsoft interoperability strategy is perceived," says Nanni.

"As an example," he adds, "a recent survey among developers in the UK has revealed a dramatic perception enhance-



# as ONE

ment about Microsoft interoperability capabilities within this key community. As a result, we believe it is just a matter of time before other audiences recognise the factual extent of our renewed approach and commitment.”

With Microsoft’s S+S vision already widely recognised as a leading strategy in the market place, Nanni believes the company will enjoy the benefits of this being a natural extension of its interoperability policy. Its recently announced Azure standard-based platform has been conceived with this in mind as it supports multiple internet protocols and enables developers to conceive and build applications in an agile and cost-effective fashion with other development environments such as Java, PHP or Ruby.

“Our Interoperability strategy is in line with the general Microsoft flexibility towards changing market conditions, in a world where spirit of collaboration between all players involved will inevitably result in innovation, and ultimately allow commercial customers to fulfill competitive advantage needs, and government agencies to better serve citizens,” he adds.

Such moves take time to bear fruit, but in this day and age enterprises cannot afford to be operating their businesses within silos, so it makes sense to bring resources and trusted partners together, pooling their areas of expertise to drive efficiency and innovation. That and the flexibility and reliability offered by on and off-premise will ensure fewer sleepless nights for users and foster renewed faith that those in Redmond are really trying to change their spots.

For further about Microsoft’s commitment to interoperability visit: [www.microsoft.com/interop/](http://www.microsoft.com/interop/)



## JARGON...?

**PHP**  
A scripting language originally designed for producing dynamic web pages. It has evolved to include a command line interface capability and can be used in standalone graphical applications



## Green

With many organisations struggling to maintain a grip on their carbon footprint and reduce energy consumption, Microsoft is looking to lead the way both as a partner and trusted advisor.

**L**ike many organisations around the world Microsoft has committed itself to software and technology innovations to help people and organisations improve the environment.

The goal, quite simply, is to reduce the impact of its operations and products and lead in environmental responsibility. To do this, it is aiming to revolutionise the way we look at things by using technology to help solve the challenges of sustainability whilst encouraging environmental responsibility and action globally.

As Lewis Curtis, principal architect, Patterns and Practices, Microsoft Corp attests, the firm is aggressively taking action to minimize its own impact.

“We, like others, are leveraging strategies to reduce energy consumption and our carbon footprint, as well as reducing our cost so we can be a more effective company,” he says.

“We are investing significantly and releasing meaningful software-based capabilities to help our customers do the same,” he adds. “However, rather than being myopic, we see environmental sustainability as not just one product or product category, but as an architectural commitment to the IT ecosystem, something I view as being the main challenge to the industry.”

“We believe that software is foundational to solving today’s environmental challenges and enabling long-term sustainability,” adds Francois Ajenstat, director, Environmental Sustainability, Trustworthy Computing, Microsoft Corp.

He says the company is driving new ways to reduce energy consumed by technology, rethink business practices, and research new solutions.

This means looking to drive energy efficiency at all levels across the enterprise – from the desktop to the server and to the datacentre in order to ensure that each node only uses the amount of energy that it needs.

When looking at the cloud, Ajenstat believes we must consider two elements.

These, he says, are the way in which Microsoft is building cloud infrastructure to reduce its impact on the environment and how customers can use this infrastructure to reduce their own impact upon this.

“For the first,” he explains, “it’s about efficiency and improving on our power usage effectiveness. But it’s also about driving innovative approaches to building datacentres that reduce the impact on the environment.”

This might mean using one hundred percent hydro-power in Quincy, Washington, leveraging containers in Chicago, or

having natural air cooling our servers in Dublin, he says.

The second part is all about customers rethinking their infrastructure and reducing their impact by using the cloud to host their servers and applications.

Going down this route and opting for a software plus service approach (S+S) can also help deliver the environmental benefits many are yearning for, not only through reduced infrastructure but also from a reduction in energy costs associated with equipment and its use. It’s also a great way of keeping the power usage effectiveness (PUE) low and under control for both Microsoft and its customers.

“We’re seeing tremendous interest from the marketplace on our DC approach,” adds Ajenstat. “We’ve hosted events for customers, we’ve shared best practices and we’re being very transparent about what we do.”

Looking at the current market offering for environmental sustainability solutions for IT, Lewis says that you will see them being offered in strategic IT buckets of sorts: consolidation, efficiency, intelligence and transference.

“From our virtualization solutions to other system consolidation strategies, having strong capabilities to do more with less is crucial for reducing impact,” he adds.

# Going Green





## JARGON...?

**PUE**  
Power Usage Effectiveness (PUE) is a standard developed by The Green Grid consortium to provide a clear answer to the primary issue surrounding energy efficiency within the datacentre - how much power is devoted to driving the actual computing and IT components versus the ancillary support elements such as cooling and lighting

Also of great importance is making what you have use less, whether it be from advanced power management capabilities in operating systems to coding best practices for .Net applications, it can all add up in terms of shaving those carbon footprints.

Lewis says that intelligence should be high on the list of priorities as companies cannot manage what they cannot measure – something that will ring true with IT managers and CIOs the world over.

For Microsoft this ranges from its own internal capabilities to business intelligence, dashboard and help environments for consumers.

“It’s important to have an environmental and sustainable intelligence strategy,” adds Curtis.

Transference is often seen as a rather broad computational term, but as Curtis explains, it simply means leveraging capability elsewhere to reduce your own impact and consumption.

“We see this leveraging communication services, such as Microsoft’s Live Meeting and Unified Communications offerings to reduce travel and establish more remote collaboration while reducing environmental impact, as well as leveraging other online services offerings,” he says.

Yet, while an IT organisation should look

at all four of these key areas, they must also be aware that they should look first at their own ecosystem and be committed to the continuous improvement of their environmental sustainability progress.

“As I’ve said,” adds Curtis, “it’s a commitment. To help with this ongoing commitment, our consulting services have a technology strategy and operational advisors for our enterprise customers to meet their unique sustainability commitments.”

Of course, S+S is the philosophy that not only browsers can leverage services, but that everything, everywhere leverages services in compelling ways. From embedded, mobile, rich clients and even gaming platforms leveraging online and local capabilities, an environmental sustainability strategy for S+S should start including all of the four big areas for its success.

“As opposed to a generic cloud offering, S+S comes in various models,” explains Curtis. “Architecturally, as one designs S+S solutions, it will be important to take a comprehensive focus on each decomposed element in the design. Of course, from a datacentre design perspective, Microsoft has been building some of the largest operations in the world for years. Moreover, we share our best practices and opera-

tions, meaning customers can actually walk through the physical datacentre itself.

This last bit here is important, as the datacentre market has traditionally been shrouded in secrecy with firms keen to keep technology and developments behind closed doors. However, it is hoped that this change of stance will spur innovation and make significant inroads on the quest to reduce the carbon footprints of these whilst delivering performance enhancements.

Curtis draws comparisons between what happened within the security market and what is happening with sustainability today.

“Security went through a similar issues several years ago,” he adds. “Initially, many thought a virus checker and a firewall constituted a security solution for the enterprise. However, it wasn’t until defence in-depth models started to emerge that security was beginning to be taken seriously.”

Curtis believes that this is what is required for environmental sustainability going forward.

“It needs to be treated as a valid systemic quality attribute for IT Architecture. Like I’ve said, the biggest challenge for the industry is approaching ‘environmentally’ as an architectural commitment,” he adds.

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