



## Heads in the Cloud

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## Editorial - Face the Future

The easy part is over. To gather information to guide the next upgrade of the JANET backbone, we asked for the community's input. The community responded eloquently and with great passion.

Now we know your requirements we will be translating them into an actual architecture and a set of policies that will enable us to meet your needs. That means designing the network that we know you need now, and at the same time making sure it can meet the future needs you don't yet know you will have. We don't know either, of course, just as five years ago no one knew that there would be an unprecedented funding crisis and that services would be converging onto shared architectures like never before.

It has been an eye opening process and not without entertainment. One group pondered sagely upon their own requirements; noted that JANET is a very well provisioned, very wide area network with a wide geographical reach; and daringly suggested that perhaps other sectors related to education should be allowed to use it too. We're sure the researchers, scientists, teachers, lecturers, trainers, local government authorities, students and pupils who use it daily would agree.

JANET was born in an era of much stricter demarcation than today. It was

the network for the education and research communities and the name was more familiar to most of its users than the Internet.

Today, proud as we are of the JANET brand, we are also aware that most users don't know or care what network they are on. They only want, and expect, the network service. Like the proverbial swan gliding elegantly across the water, what looks effortless and serene from above is only made possible by a lot of activity out of sight. For example, we hear from eduroam users who completely forgot that they had eduroam on their laptops until they went to another university, turned their laptops on and went on the internet – only later remembering that what they had just done shouldn't have been possible.

The Internet assumed its global proportions by many smaller networks coming together and interoperating with a common set of protocols. This remains relatively simple, in principle; but it must be remembered, particularly here in the public sector, that each of those smaller networks arose in the first place to meet the defined needs of a specific user group. True network transparency requires strict rules and standards to make sure that users of one network see no diminution in their own service and yet that local restrictions don't get in the way of the users of other networks.

It is not a simple task but it is a very important one.

JANET(UK)'s new brokerage for virtualised services, meanwhile, is not so much about getting different sectors to interoperate but is very much in the same ballpark. Virtual services are becoming a commodity, like electricity. When you turn on the light it is irrelevant to you which supplier the electricity comes from or how it was generated. If it no longer matters to the typical user which network they are actually on, likewise it no longer matters really where the services they are accessing are based.

Except of course that it does matter, very much so, for example in terms of security and privacy of data which can be affected by the real world politics of the location where the physical hardware is based. A lot of hard work will go into giving users the luxury of apparently having services on tap regardless of their location.

This is the reality facing us as we begin planning the next upgrade. And yes, whatever form the upgraded backbone takes, other sectors may use it too.

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## Connectivity on the move with JANET 3G for eduroam



An increasing number of academic and support staff are living their life on the move – whether that's on campus or further afield. The new JANET 3G service for eduroam provides a flexible range of data-only SIM packages that are specifically designed to meet the needs of the academic and research communities.

JANET 3G provides a wide selection of price plans that will let educational organisations precisely match their users' needs whilst keeping control over costs. Seamless integration with eduroam means organisations can use the same authentication mechanism for mobile users, which enhances both familiarity with the service and an organisation's own security.

Data packages available range from low usage machine-to-machine plan to genuine 15Gb data allowances for demanding users, providing a real breadth of choice. The service comes as a press-out SIM on a card, available in both standard and micro-size, useable with the iPad and tablet family. Alternatively individual users can add a dongle or create a Wi-Fi hub for up to five users with a Mi-Fi device.

JANET 3G will be launched at Stand 23 at Networkshop 39 (12th – 14th April) and will be available from 1st June 2011.

Organisations buy in to JANET 3G via a framework agreement negotiated by JANET(UK) with our preferred supplier, and can therefore be confident that JANET has performed all due diligence. For further information about JANET 3G please visit [www.ja.net/3g](http://www.ja.net/3g) or contact the JANET Service Desk: [service@ja.net](mailto:service@ja.net) or 0300 300 2212.

## JANET News Online

JANET News continues to evolve with the introduction of the new JANET News homepage.

News stories are now announced as they happen at [www.ja.net/janetnews](http://www.ja.net/janetnews), visible whenever you visit the JANET home page. Alternatively you can subscribe to RSS feeds to be notified immediately.

The quarterly magazine that you are holding in your hand will continue but will move more towards a magazine of articles, reviews and comments as well as news. It will continue to be available as an environmentally responsible HTML version as well as in print. To sign up, please send an email to [janet-news@ja.net](mailto:janet-news@ja.net) or visit <https://www.jiscmail.ac.uk/JANETNEWS-ONLINE>.

# Moonshot on target

## Trial shows proof of concept success

The JANET(UK)-led Moonshot project has taken a significant step towards achieving its goal of extending the benefits of single sign-on authentication and authorisation to non-web applications, and hence increasing the range of opportunities already opened up for users of web-based applications through services such as the UK Access Management Federation.

A successful demonstration of federated authentication using client and server applications on Linux has been extended to incorporate other more common applications and services,

including email, instant messaging, secure shell and others. These demonstrations have greatly increased confidence in the Moonshot technology's ability to deliver its goal of providing users, systems administrators and service providers with a common security technology for all services.

Users and organisations today must become familiar with, and operate, a variety of different authentication methods and systems, which often degrades the user experience, impedes adoption of new services and increases costs. Developed

in partnership with GÉANT, and the pan-European authentication and authorisation services that it operates (such as eduroam and eduGAIN), Moonshot may provide a common unified approach across Europe and elsewhere for managing access to a broad range of services and applications, using a single technology and infrastructure. The technology it develops will work with a range of services from Cloud infrastructures to commonly deployed services such as mail, filestore, remote access and instant messaging.



## JANET(UK) to manage new virtual services brokerage

In an area that is fast growing but as yet has no standards and no set model of delivery, the new JANET brokerage will promote interoperability and bring clarity and coherence.

The aim of the brokerage is to promote the uptake of off-campus data centre and cloud services, creating efficiencies and cost savings for the sector and a competitive market based on technically sound platforms.

Organisations are already moving to the cloud both for running services and for data storage but each is having to find its own way. The problem for many is not so much running virtual services as obtaining the services necessary to do so, and adoption may be at the infrastructure, platform or software level. The brokerage will help build requirements for the sector as a whole, build suitable terms for new

services, and develop the processes and environments necessary to provide technical solutions and to work effectively with the commercial sector. It will help organisations reduce the risk of adopting new services, and improve and add value to their existing ones by leveraging a virtual infrastructure into their deployment.

While the brokerage will act within the HE sector it will also be building relationships with commercial partners, formalising a role that JANET(UK) already fulfils very well of understanding, aggregating and communicating the needs of the sector to commercial providers in a trusted, professional manner. The effect will be to add quantifiable value through brokering and gaining beneficial commercial arrangements, frameworks and licences.

The brokerage will also be available to answer technical, financial and organisational questions.

The new service is a logical development of several existing trends and drivers.

**Financial:** over the next four years, the HE teaching budget will be cut by 40% (£2.9bn) and the FE teaching budget by 25% (£1.1bn). Departments are merging and funding is difficult to access as funding councils change their methodologies. Some universities now find they can no longer afford to store all the courses a student has run in a VLE.

**Technological:** the service builds on the existing and already well-developed trend of moving from campus dependent to location independent services; away from hardware specific applications to virtualisation and the ability to host applications such as VLEs.

**Environmental:** Servers are consuming ever more power and power costs are



“Too many universities operate in an outdated way. They’ve failed to recognise the savings and service improvements that could be obtained through engagement with commercial partners and the use of shared services. . .”(Policy Exchange, Higher Education in the Age of Austerity)

rising. While institutions are focusing on cost reduction and service improvement, an on-site data centre can use up to 10% of an entire campus’s power. Additional carbon-related taxation is also becoming increasingly likely and any organisation with a Carbon Reduction Commitment will notice an immediate impact.

This work forms the centre piece of a project by HEFCE’s University Modernisation Fund (UMF) to create efficiencies, make savings and improve services for the HE and FE sectors. In practical terms, a core virtual server infrastructure will be deployed in data centres that offers discounted data management and storage services through shared virtual servers and data centre capacity to HE institutions. The service will start with a pilot at Eduserv, which



Cloud computing is the delivery of flexible computing resources over the Internet by external service providers. Organisations using cloud computing access data centres, application software or web services from any location via a service provider. This provides flexible provision which the customer can scale up or down to meet demand. See page 20 for a report on a recent cloud computing seminar that detailed the latest in theory and practice; and page 10 for a new cloud computing solution implemented at Loughborough University.

will work in collaboration with the Digital Curation Centre.

Initial work is centred on establishing the brokerage organisation, negotiating and setting up the learning lab environment with Eduserv, and working with various UMF-funded initiatives in the sector to create a suitable delivery infrastructure. Rapidly, as the brokerage becomes suitably resourced, negotiations will commence with commercial providers to overcome inherent blocks to adoption and to use the aggregated purchasing power of the sector effectively.

Up to £5.1 million will be invested in this aspect of the shared IT infrastructure programme, including funding to develop a sustainable financial model for the brokerage beyond the life of the University Modernisation Fund. Up to a further £4.9 million will be invested in developing HE research data management applications to be deployed in the shared services environment.

David Sweeney, HEFCE Director for Research, Innovation and Skills, said:

“At a time of pressure on university resources, it is critical that technology is used in a collaborative and cost-effective way, to deliver services that will benefit the sector. Cloud computing has the potential to do this in ways which will serve the academic community leading to improvements in research, teaching and administration.”

To assist with the service, JANET(UK) is looking for universities and colleges that are looking to develop or move their data centres; have adopted, or are looking to adopt or provide campus data centre and cloud services; or are negotiating for these with commercial providers. We also intend to recruit a Technical Lead, a Business Group Manager, a Project Manager and a Product Development Manager. Interested organisations and individuals are invited to contact Dan Perry, Head, Strategic Business at JANET(UK).

## Putting JANET requirements into practice

The depth of feeling of JANET users, and the importance they attach to the network, has been demonstrated by the intensity of their response to a simple request from JANET(UK): what are your requirements for the next upgrade to JANET?

The result is shown on page 6. As similar processes have taken place in the past for the various versions of the backbone and network, a different style and process of consultation has been needed on each occasion, tailored to the circumstances at the time. In the present environment of change and uncertainty, and as JANET's own uses are changing with increasing outsourcing and reliance on the network, it was felt that an approach of direct engagement with groups representing the various sectors that use JANET would be the most effective. Therefore, while previously JANET users have simply been invited to respond, this time JANET(UK) not only invited all users to share their requirements generally but went out to them to gather their needs through a series of targeted workshops covering Research, Higher Education, Further Education and Schools/Local Authorities. The result was one of JANET(UK)'s most engaging and proactive requirements gathering processes yet, and the successful completion of the exercise signals the next step in JANET's evolution: the backbone, the regional delivery infrastructure, and the broader international delivery relationships.

JANET(UK) would like to thank everybody that participated in this process for their contributions. Without exception, what came across very clearly

was that all those who participated did so enthusiastically and that JANET is a valued and highly regarded service.

### Changes

The assumptions that the present backbone is based upon are now more than five years old, and even before starting to gather requirements, JANET(UK) knew that much would be different. One change to emerge that will come as no surprise is the severe financial climate, resulting in all research and education institutions examining closely where they can make efficiency savings and in some cases refocus their activities. This has led in turn to a trend for outsourcing or sharing services to gain efficiency savings, and increased collaboration/consolidation within sectors. Education has also become much more competitive nationally and globally. Students increasingly see themselves as 'customers', with expectations around where, when and how they learn challenging traditional methods of delivery; and on the global scene, education in the UK has a very strong brand value overseas and many universities are establishing overseas campuses, partnerships with foreign universities, or a specific presence in London to attract overseas students.

The use of ICT in education and research is ubiquitous and increasingly many network-based applications are media rich, using high definition video which in turn has increasing demands on the network in terms of performance and capacity. Research Grids are becoming more pervasive across all science disciplines: the total output generated by

the UK research community ranks third in the world, behind only that of the US and China, and has an estimated value of up to £4.2 billion to the UK economy. The volume of data generated in research and by scientific instruments in recent years now far exceeds all the technical and scientific data collected in the history of research to date. This trend is set to continue, with data being produced at an increasingly rapid rate.

## Requirements Identified

In this context, the requirements that will guide the next version of JANET have been identified.

A highly reliable network service is critical to customer organisations. At first glance an obvious statement but this is now increasingly emphasised with the move to using offsite services. Such has been the increase in research since the last update that some research communities are now experiencing difficulties in achieving reasonable throughput on their network data transfers: a matter that must be addressed.

Support for increased range of partnerships. With growing collaboration both within and across the sectors that use JANET, and also into other parts of the public sector such as Health and Local Government, JANET must be able to support the transmission of information securely across a wide range of organisation types. Significant efficiency savings can be made by elements of the

public sector working together on the provision of shared network services. One example is the Welsh PSBA network which brings together education, local government and health into a single network services infrastructure.

Provision of an increased range of network connectivity products. There can be significant benefits in bringing together an organisation's communications requirements and delivering these via the common underpinning infrastructure of JANET. This means a need for a rich range of network connection services: for example, higher assurance levels for secure transmission of network traffic, LAN connection services for JANET-connected organisations that are geographically distributed, and support for applications such as IP telephony and data centre connectivity that have strict parameters associated with bandwidth, latency and jitter.

Any place, any time network connectivity. The use of personal portable devices has increased enormously in recent years. Coupled with the increase in distance learning, homeworking and workplace learning, and the general internationalisation of education and research, this also means that the reach of JANET beyond the traditional fixed campus environment is important. To support this an increase in the coverage of eduoam was encouraged, coupled with the provision of a range of other JANET services such as 3G mobile and DSL and collaboration application services.

Support for third party service providers. Given the trend in outsourcing services, how the services are connected to JANET to ensure better reliability and performance is important. The JANET architecture must be coupled with appropriate connectivity and hosting products that better facilitate third-party supply.

Support for the carbon reduction commitment requirements placed on JANET connected organisations by their funding bodies. JANET can play an important role in supporting institutional carbon reduction by promoting and delivering shared services, for example videoconferencing services and access to large, energy efficient data storage services.

Maintain the requirements of the previous backbone. The requirements identified five years ago have been added to but have not changed themselves. They are still viewed as very relevant and should be carried forward.

## Next steps

The job of upgrading the backbone is of course far from over and these requirements must now be translated into a physical network. JANET(UK) will keep the momentum going by determining over the coming months how these requirements will be met through the architecture and design of the next stage of JANET's evolution and, as appropriate, via the broader JANET services portfolio.

The requirements analysis and further details are available from [www.ja.net/six](http://www.ja.net/six).

## HEFCE review identifies JANET as a critical part of information services infrastructure

JANET(UK) has welcomed the HEFCE review of the JISC which clearly identifies JANET as a critical part of the UK's research and education information services infrastructure.

The review endorsed the on-going need for the provision of a world class

network fit for today's changing operating landscape, and proposed a future, more strategic shape for JISC with a focus on projects that generate savings through greater efficiency while also delivering impact. JANET(UK), which receives significant funding through JISC, has

increasingly become a company with a strong customer focus, developing an ever closer direct relationship with both customer and stakeholder, and we welcome the opportunity to participate in the consultations regarding the future role of the JISC.

# JANET use by the Schools Sector in England

**JANET's value to the schools sector in England has been demonstrated by the Department for Education's (DfE) decision to continue to provide central funding for the network's continued use in the forthcoming financial year (April 2011 through to March 2012): not only in what might traditionally be thought to be the schools sector but also in sixth form colleges.**

The decision means that schools and sixth form colleges in England will remain able to use JANET without needing to pay an increased charge. (In most cases use of JANET is free at the point of use, but some colleges top up their JANET service with additional bandwidth.) This applies in the case of schools to the use they make of JANET via ICT services provided by Local Authorities and Regional Broadband Consortia (RBCs), and their delivery partners.

## Making the case

After the change of government in May 2010, and the subsequent changes to schools ICT funding and support policy, it was unclear as to whether this central funding would continue. An additional complication was that funding responsibility for sixth form colleges' use of JISC-funded services, including JANET, moved to DfE from the Department for Business, Innovation and Skills with effect from April 2011.

Supported by the sectors involved and in particular by the RBCs, JANET was able to make the case to DfE for continued funding, based on the demonstrable benefits to the sector that accrue from a centrally-funded approach which provides for a universal and high-quality service tailored to the education sector's needs. It also represents much better value for money than a disaggregated approach to procuring these services. Not only can the buying power and expertise of the whole education and research community be exercised through JANET

but the costs of very many independent procurements are avoided.

The continued funding will also maintain access to other JISC-funded services besides JANET. Use of the UK Access Management Federation to manage access to learning and other resources will continue to be available, and sixth form colleges will also continue to enjoy all other JISC-funded services, notably the highly valued Regional Support Centres.

Commenting on this development, Mel Philipson, Chair of the National Education Network Managers' Group, said, "The RBCs very much welcome this opportunity to continue their collaboration with JANET in providing coherent national services to schools across the UK. The DfE's decision allows us together to continue to provide these services at the lowest possible cost."

A sixth form college Principal added, "Our JANET connection and the services it provides are a critical part of the ICT services we provide to our students. We are very pleased to hear that this will continue to be funded in these difficult times. It is extremely helpful in allowing us to continue to provide and to enhance our services."

## The Policy context

The DfE decision for this financial year sits within the wider context of the James Review of Education Capital, commissioned last July by the Government and published this April. The Review looked widely at capital funding by the DfE for the development of the schools' estate and for the services schools will require in the future. ICT services were included and the review makes a number of recommendations.

In addressing ICT provision the Review makes the point that there needs to be a clear set of relevant ICT services from which individual schools can select and

pay only for what they need. It urges the Government to capitalise on the value of existing public-sector broadband networks, aligned with other Government initiatives, such as the superfast broadband initiative to build the UK's broadband capacity in general. It also recognises the needs for appropriate standards and procurement assistance in achieving this. It makes the observation that smaller institutions in particular may benefit from a relatively high broadband capacity, to enable them to use remote services to reduce their costs and gain the most from any central investment.



**Our JANET connection and the services it provides are a critical part of the ICT services we provide to our students**

These views accord with a number of themes in the *Government ICT Strategy*, published by the Cabinet Office a month earlier. This emphasises the need to share and re-use publicly-funded ICT facilities wherever possible; to open up the market to new players via standards and the removal of costly administrative barriers; and to capitalise on the Government's collective buying power to improve procurement outcomes.

The themes emerging from both these reviews very much reflect what JANET has been about for many years: delivering fit-for-purpose services across the whole of the UK's education and research community; and doing so via aggregation of demand and a sophisticated approach to the market. We are very pleased that, both in its strategy and in practice, these virtues continue to be recognised by Government as it sets policy in this area.

## Death of the Internet greatly exaggerated



Following the recent media stories suggesting that the Internet might be 'running out', JANET is one of the best placed networks to show the way ahead.

Recently there have been a number of stories in newspapers, on the TV and on radio asking essentially 'is the Internet running out of addresses?' For a lot of users the answer is 'yes' – but only because they continue to use IPv4, the version of IP first deployed back in the 1970s. For organisations willing to update to IPv6 the Internet is in no danger of running out of addresses at all.

### What is happening

The Internet Assigned Numbers Authority (IANA), which is responsible for the global coordination of Internet addresses, distributes ranges of addresses to Regional Internet Registries (RIRs). On 3 February 2011 IANA allocated the final five ranges, each equivalent to 1/256 of the entire address space, to the RIRs. In other words, IANA has no more addresses available to allocate.

This event was anticipated well in advance. Most of the Internet currently runs under IPv4. The 32-bit address space used by IPv4 allows a theoretical 4 billion devices to connect to the Internet. Although that is a very large number, it is still a finite resource and it has always been accepted that it will one day run out. The process has been hastened in recent years as more and more mobile devices connect to the network – something not widely expected to happen 30 years ago.

The Internet Engineering Task Force (IETF) has been developing IPv6, the successor to IPv4, since 1996. IPv6 allows a vastly increased address space, offering 128-bit addresses in place of IPv4's 32-bit

addresses. JANET began to support early IPv6 trials in 1998, and while currently only a handful of UK ISPs offer IPv6 to their customers, JANET has the biggest UK production deployment.

### What happens now?

In the short run, many universities are lucky enough to have large assignments of IPv4 space from systems that pre-dated the RIRs. They may be able to continue to grow and provide new services using this space. Many smaller institutions use Network Address Translation (NAT), which requires only a small number of addresses and which some find more secure: it also serves as a workaround letting hosts running IPv6 communicate with hosts that run IPv4, and this makes them largely independent of the requirements for public addresses. However, services that are available to other sites and data-centres hosted off-site require public addresses to be reachable. Even with NAT, sites may find a gap between the last IPv4 address being handed out and their ability to deploy IPv6 ubiquitously.

RIRs will continue to assign their remaining resources until they each only have a single range of address space remaining. At that point other policies come into effect, and Local Internet Registries (LIRs) such as JANET(UK) will only be able to receive one more small block of IPv4 address space. JANET(UK) will continue to allocate from the address space it has received from the European RIR, RIPE, until that is exhausted. At the moment we are using that at a relatively slow pace due to the widespread use of NAT among the community. The special policies in place for the last range should help to ensure that new services deployed on the Internet can continue to receive IPv4 addresses.

In the longer term, we continue to advise all of our customers to investigate IPv6 and devise a deployment plan as soon as possible. There are short-term alternatives and fixes but a commitment to IPv6 is the only long-term solution for IPv4 exhaustion and for meeting the massively expanded demand for addresses.

JANET provides a range of support for organisations wishing to implement IPv6. Technical guides for IPv6 (recently updated) and IPv6 Multicast are available, as is a summary for network managers and a list of links to other useful resources.

There may still be some time before IPv6 is as widely adopted as it needs to be, both within JANET and the wider community. A few thoughts on that, and an invitation to participate in some discussion, are in JANET's Development Eye blog.

JANET(UK)'s IPv6 page: [www.ja.net/development/network-engineering/ipv6/](http://www.ja.net/development/network-engineering/ipv6/)

Development Eye: [webmedia.company.ja.net/edlabblogs/developmenteye/2011/01/20/ipv4-exhaustion-and-the-janet-community/](http://webmedia.company.ja.net/edlabblogs/developmenteye/2011/01/20/ipv4-exhaustion-and-the-janet-community/)





# Wi-Fi visualisation tool helps plan the network

A new tool developed at Loughborough University, which provides an almost real-time indication of wireless usage and provision on campus, has applications of use both to technicians and management.

As a management information tool, along with the supporting log files and graphs the system can inform the installation of more wireless access points (APs) or the upgrade to higher density 802.11n APs. A displayed map of campus provides an at-a-glance view of the wireless usage in different buildings, which can identify areas of oversubscription for the wireless APs in use. Users can zoom in and click on locations, and a count of APs and the active users in that building will immediately be displayed.

The system supplements additional data analysing the student usage of wired versus wireless access within halls of residence, and this management information informs the future provisioning decision of whether or not to continue to provide wired access in halls or to provide wireless only. Matthew Cook, Network & Security Manager, adds that this information is "becoming even more important as we prepare for the Olympics in 2012, and the focus on the roll out of additional access points to improve the student experience which Loughborough is famous for". (Loughborough is the official preparation camp for Team GB in the forthcoming Olympics.)

As launched, the technology is based on Google Earth, which can locate a building but has no concept of the building's interior. This means that locations within a building cannot be given. However, Google has recently agreed to conduct a street view survey of the Loughborough

campus which will let the team expand a new feature to locate switches in the 300 or so communications locations across the 437 acre campus. As the university streamlines its support operation, the second tier support team will be able to locate a switch and zoom into street view to find the entrance to the building concerned. This visual location will be supplemented with details of the keys required, maps, rack layout diagrams and other supplementary information, so that they can reboot a switch or patch another network socket without escalating that request to the third tier Networks Team.

The tool is implemented via the Google Earth plug-in and evolved out of a research project involving Ramesh J. Baskaran and his supervisor, Dr Iain Phillips. The team is also exploring other uses for the visualisation technology.

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## UK Access Management Federation operator change from August 2011

From 1 August 2011 the operation of the UK Access Management Federation will transfer from JANET(UK) to a partnership of JISC Collections and EDINA. JANET(UK) will continue in its role as managing operator until 31 July.

JANET(UK) will be working closely with JISC Collections to ensure that the transition is successful so that the UK Federation continues to serve its customers.

Tim Marshall, CEO of JANET(UK) said "I am very proud of the work done by the team at JANET(UK) since November 2006 to grow the federation into the world's largest SAML-based academic access management federation with over 840 members with over 1200 entities – this is no mean achievement and we look forward to supporting JISC Collections and EDINA as they take the UK federation forward."

# Out with the old, in with the new

## Loughborough's new data centre shows the way to the JANET community

A new data centre solution implemented at Loughborough University is notable for several reasons. It is an environmentally friendly option that saves Loughborough space, money and time; it is the first commercial data centre solution that plugs directly into JANET; and its success has considerable implications for the entire JANET community.

Loughborough was faced with a situation common to several universities – its 40-year-old data centre, built with Computer Board money in the 1970s, was at the end of its life and badly in need of replacing. Using the latest and greenest technology has enabled Loughborough to avoid the need for a multi-million pound refurbishment project by building a hybrid cloud – a generic term for a combination of local and remote data centres using cloud technology.

Locally, the new Loughborough data centre is housed in two 'mini-pods' – the term used by Phil Richards, Loughborough's IT Director, for modular containers holding chilled racks with enclosed cooling systems – housed at either end of campus. The mini-pods are modular and easily extendible, and part of the design brief was that the local cloud be completely symmetrical so that any service can run from one half or the other. Hence, one mini-pod can be switched off for servicing and users won't notice any change in the service they receive. At the same time, the system was to be part of a bigger whole that featured remote data centre capacity.

The supplier selected for the data centre service was Logicalis, chosen for its cooperative cloud offering and because

at the time it was in the late stages of connecting to JANET (see separate story). Thus Loughborough now has a data centre service that is modular, economical, green, and fully resilient at the local level with the option of hosting services remotely at Logicalis's data centre in Slough.

Phil says that the cooperative cloud removes the distinction between a private remote hosted cloud (for example a university with services running on their racks in a third party's data centre) and the public cloud (for example Google Mail, where your mailbox lives somewhere on a rack in a massive data centre: a solution that is cheaper because of economies of scale but risky with issues concerning security, data protection and so on). The Logicalis cooperative cloud is the first solution available over JANET that does this, with cloud capacity in rack space that is dynamically reprovisioned: that is, allocated in an optimised way according to need and usage.

### Local or remote?

Whether to run a particular service locally or remotely, says Phil, comes down simply to price.

"The cooperative cloud from Logicalis lets you move services from local to remote and back again without buying in more infrastructure. Local capacity should see us through the next 2-3 years at least. Beyond that it comes down to price. The local cloud has an elastic design so if it's cheaper to run locally, we can buy extra minipods to bolt alongside the existing ones. If by that stage the cloud market has become more efficient so that it's cheaper

to run things externally, we will do that. We might never have to buy another new bit of tin at Loughborough."

"I can't predict when it will become cheaper to run entirely off the cloud but I believe it will happen, and as soon as it does, I will be able to look at the pricing options; as long as the quality of service is equivalent I will move the service to run remotely and save the university money. We have the flexibility either to grow local capacity or to go remote, based purely on cost parameters, but in either case we have avoided the need for a multi-million pound building refurbishment project. That's a good strategy for any university faced with the choice of what to do with a 40-year-



old data centre that has had a good innings but is overdue for retirement!"

**New for old**

Phil says that the university originally thought in terms of simply rebuilding and refurbishing the old data centre: refurbishing space for 40-50 racks of equipment but cooling it in a better, greener manner. To that end it began an EU competitive dialogue tender process, looking for an infrastructure partner that would work with the university on three projects – refreshing the university LAN, providing a VoIP system to replace the

"We were able to let suppliers open our eyes to the alternatives to a big refurbishment project," says Phil. "A full old-style refurbishment could cost £2-3m in mechanical and electrical work alone before buying a single disc or server. The development of blade servers and virtualisation now means servers can be packed into a much smaller space: each blade can run many logical servers. To meet the current and future needs of the university, Loughborough didn't need a big building project at all – it just needed half a dozen racks."

**Buy-in**

A wide variety of people from around campus were involved in the competitive dialogue process, says Phil: not just members of IT services but also IT staff based in academic departments, 3-4 senior members and heads of departments, and the Chief Operating Officer all came to the dialogue sessions.

"If we had just gone to the IT committee with a proposal not to refurbish but to buy two minipods and put services up on the cloud, it would have been seen as risky and wouldn't have worked. However, competitive dialogue with four suppliers all telling us similar things, and a wide audience within the university, has built shared understanding about why this was a better way forward. This helped us get buy-in for the strategy from all levels, right around the university."

**Advice**

Phil's advice to universities facing the same situation as Loughborough is to ask: "given advances in miniaturisation and virtualisation, do you really need all that rack space on campus? Think from the outset how you can combine local capacity with options to go to the cloud as part of your design concept. Even if you don't place a single service remotely in the first three years, there will come a time when it's cheaper to go remote and you will

know how you're going to do it. If you're worried about buy-in, consider competitive dialogue. It takes longer and is harder work but it has clear benefits."

**Future**

Phil intends to monitor remote cloud options, especially the cooperative cloud, closely. "Other alternatives will come along: if they are cheaper than the cooperative cloud, that's where we'll be running our stuff. I'll be keeping a very close eye on that."

"I hope to feed into JANET's brokerage work for remote cloud services: we will certainly be a consumer of what they produce. By pooling together requirements and approaching suppliers as a sector, with our own fast backbone like JANET to distribute services to customers, we can get a much better price than if individual universities approach suppliers. JANET will be an important agent and broker in securing competitive pricing."



Given advances in miniaturisation and virtualisation, do you really need all that rack space on campus? Think from the outset how you can combine local capacity with options to go to the cloud as part of your design concept. Even if you don't place a single service remotely in the first three years, there will come a time when it's cheaper to go remote and you will know how you're going to do it.

existing telephony, and the data centre. Four suppliers were shortlisted, including Logicalis.

However – and fortunately – a part of the competitive dialogue process is that once the shortlist has been drawn up, the customer can enter into discussion with the suppliers over its precise requirements. Loughborough had not specified precisely how the data centre work was to be done: the tender simply defined it at a conceptual level, saying that the existing data centre capacity should be provided for in a way that was greener than before. As discussions proceeded, it became clear from all four suppliers that the old way of doing this was no longer required.



"There's an analogy with electricity and the national grid. The grid is centrally controlled, different power companies compete to provide services with common standards, and customers can switch from one account to another. JANET will become like the national grid, controlling standards and creating a marketplace so that suppliers can compete for virtualised cloud services."

# Data centre and cloud service extends to the JANET community

Logicalis has become the first commercial supplier to connect directly into JANET at the nuts and bolts level, offering data centre and cloud services to the entire education community. Their offering is already paying dividends in its installation at Loughborough University (see page 10).

Chris Gabriel, Director of Solutions and Marketing at Logicalis, says the company has been a supplier of ICT solutions and services to the HE and FE sector for many years, mostly with services on site: for example networks, infrastructures, data centres and telephony. However, with the growing demand for and acceptance of delivered applications and infrastructure, its data centre strategy took a new turn. Logicalis's new high-density data centre opened officially in June 2010, along with the launch of its cloud services.

From the outset, says Chris, it was considered vital to leverage JANET's footprint and investment and unique offering to the community.

"It really is of strategic importance to us to be a part of the JANET community. JANET is one of the forefathers of the shared service model and a fantastic ITC services market. It provides an audience of potential customers connected to a service that is capable and large enough to cope with the kind of services we want to deliver. To access our service we don't have to put infrastructure on site. Providers can host a service on our cloud, then tell customers it is already available – simply subscribe to it. JANET is a unique market place."

Simon Daykin, CTO of Logicalis, adds: "JANET is the de facto choice to interact with HE and FE customers, and the ability to interact with these customers natively is really important. Alternatives like building dedicated point-to-point networks simply

don't make sense when there is access to such a high quality and high reach network as JANET."

## Offering

Chris says, "We offer the education sector an extended connection rather than just a single connection to a single university. Infrastructure and storage are already available. If a university requires a high power computing environment and struggles to do it on their own premises due to power constraints, Logicalis has more power than we know what to do with and the ability to deliver it in a single rack. Our high density, high powered data centre can support up to 32kw racks in any location."

Simon Daykin adds that extending the JANET connection down to the rack is easily done – it is native to the



Alternatives like building dedicated point-to-point networks simply don't make sense when there is access to such a high quality and high reach network as JANET.

Logicalis platform. "The infrastructure service platform provides a fully virtualised network onto which Logicalis can put multiple logical networks, which can then be distributed down to individual customers' environments. The JANET link terminates within the Logicalis 'Network as a Service' platform so that when a customer requests a service such as a port in the rack, or a logical service such as computing or storage, we can stand those services up, natively connected to JANET, very quickly and easily."

To sign up, says Chris, universities are invited simply to "phone up Logicalis and

order a rack. The JANET connection is then taken down to that organisation's rack. The data centre and cloud infrastructure are already there as predefined services. Applications can be hosted very simply: for instance a university can administer its own Moodle application but it is hosted on our server, giving the university access to storage space. We just feed and water their infrastructure for them. It is a very simple subscription model whether for hosting, co-location, cloud or future applications."

## Dialogues

Logicalis is also working with independent software vendors and the end user community within the HE and FE establishment. "If five universities in a region want a data centre service, we can work with them on a model,"

says Chris, "whether it's building something discretely for them in the Logicalis data centre or they take the data centre service themselves. We can also identify the top applications that are being

used – the ones they are each separately building their own infrastructure for – and work with software providers to put it on the Logicalis cloud. This can then be taken as a service too."

"In the Loughborough model, the network will be used to send data back and forth between two different data centres, which means a different traffic pattern. This is where dialogues will be key as they will change the dynamics of how JANET is used and how the community takes its service. It is a mash-up of ideas and interests leading to new ways of working: for instance, a university managing

its own cloud service could manage another's too."

Simon describes this as "a shift in IT service delivery. Organisations can avoid the significant costs of running their own data centres and running and managing infrastructure. Loughborough avoided a multi-million pound project to replace its own data centre. Precise savings would depend on what costs are being used: a university in central London would find it hard to get power and space while that may not be a problem for a university further out."

"All customers so far have expressed significant interest, though our offering has only just launched. A number of universities have seen Logicalis's investment in the JANET link as a key indicator: it gives confidence to these organisations that Logicalis is a provider they can trust to invest in these areas. Investment in data centres, services and the JANET link is very high. Customers see the clear advantage of thinking in new ways about how they can think about data centres, and a clear route to doing so."

#### Future

Logicalis will continually make further investments in service delivery capability, says Simon. "This is not just a flash in the pan, this is a strategic direction. Further platform capabilities will be made available through data centres and connections. The ability for universities to take IT as a service and have platforms on which they can truly deliver shared services is vitally important. This will provide the cost savings and quality and availability of IT service delivery that these organisations need.

"Moodle is a good example of organisations looking forward to deliver critical applications to a user base on and off campus. We are also thinking about hosting shared platforms for shared services such as back office systems, and staff email systems across the spectrum."

For further information:  
hddc@uk.logicalis.com

## Best practice between N3 and JANET

Best practice between HE and the NHS will be identified and shared through a new group set up at the request of the NHS-HE Forum. The group will look at general topics such as how N3, the private NHS network, and JANET can network securely, the use of terminal services, and procedures and policies around all these items; it will also look at the more particular topic of access directly from NHS desktops, as it has been found that some web facilities are being blocked at some NHS sites.

In response to this last case, the Strategic Health Authority Library Leads IM&T Group has already published a whitelist of URLs which should not be blocked

([www.libraryservices.nhs.uk/forlibrarystaff/information/technology.html](http://www.libraryservices.nhs.uk/forlibrarystaff/information/technology.html)) and, on behalf of the Working Group, Natalie Lafferty of the University of Dundee has started to list e-learning tools that are valuable for health e-learning. This will be extended with an evaluation of the benefits and risks associated with each one.

Best practice case studies, examples and guidelines will be published on [www.nhs-he.org.uk](http://www.nhs-he.org.uk) and made available through other channels. The group will be chaired by Mark Blakeman, Director of Informatics at University Hospital of South Manchester NHS Foundation Trust, and met for the first time on 10 February.

## JANET-N3 Gateway moves up to the next phase



Building on the success of the operational, resilient gateway between JANET and N3, JANET(UK) and the NHS are now focusing on the potential extra benefits that the gateway can provide.

Staff are working on the business cases for service enhancements that will make the gateway a truly shared service and extend the remit of users in both health and education, letting them use one service

where they currently use at least two and greatly extending the area of overlap between the two communities.

At present the gateway only supports access from N3 to JANET. The baseline deliverable is therefore a bi-directional service, letting users on JANET access services on N3 safely and securely through the gateway. This will be of clear benefit in a range of use cases: for example, an NHS Clinician who works part of the week at an NHS Trust and the rest of the week at the local university; a National Institute for Health Researcher working at a university who needs access to NHS-based information such as policies and procedures; and researchers who have permission from ethical committees to collect patient data from NHS trusts for patients who have consented to be part of the study. All of these will be able to access NHS systems

directly from their local academic network, removing the need to travel to or be based at each individual NHS site.

A second deliverable will allow computer-to-computer interaction between the networks so that, for example, clinical data such as MRI scans could be taken on university scanners and forwarded to NHS systems, or clinical data could be fed from the NHS for high performance computing analysis and the results fed back to the NHS to help with clinical decisions.

Remaining deliverables focus on enhancing actual services currently available: to integrate the videoconferencing services of both networks; to develop NHS Mail as a secure e-mail solution between the networks; to support use of eduroam in N3, for example to support academic staff and students visiting a health organisation; and federated access to web-based resources in a pilot health community, so that for example NHS users would have access to JANET web resources with NHS credentials.

Two further deliverables to help staff understand and resolve the governance and technical challenges involved in connecting local NHS organisations to shared network infrastructure are being taken forward separately through the N3 Succession Plan programme, which looks ahead to the point after the existing N3 contract expires in 2013, and will inform the development of the successor network.

Max Finch, Head of Voice & Data Networks and Services for the NHS Technology Office, said, "This is an excellent opportunity to build on the investment already made in the live JANET/ N3 Gateway to offer enhanced services, making life easier for staff working in health and education and clinical research."

#### Next NHS HE Forum

The next NHS-HE Forum will take place on 24 May in London. A Scotland NHS-HE Forum will be organised for soon after this.



## Customer Engagement profile: Frances Neilson, Customer Engagement Manager for Scotland

#### How long have you worked for JANET(UK) and what were you doing before?

I've worked for JANET(UK) for just over seven years. Before this I worked as a Lecturer/Senior Lecturer in Business and Economics for 16 years, in several FE colleges including North Glasgow College and James Watt College.

#### How would you describe a typical week?

There's no such thing as a typical day, week or month!. Our community, is an ever-changing environment. In the course of a week, I could be: at Lumen House for a number of meetings; in Aberdeen, Dundee or St Andrews for technical meetings; in Edinburgh, Stirling or Glasgow meeting RSC and SFEU representatives and college technical staff; representing JANET(UK) at HEIDS meetings; liaising with LTS in Glasgow; attending conferences as a delegate or manning a JANET(UK) stand; meeting with managers from individual institutions in Scotland; or at home dealing with issues arising from all the above meetings and any other business that arises.

#### What are the particular challenges or opportunities of your region?

The sheer size of Scotland is a bit of a challenge. It encompasses a third of the UK landmass. The opportunity is that with a population of just over 5 million, we are a convenient size to collaborate together both within and

between sectors. We already have higher and further education and the Glow Interconnect linking onto the JANET backbone. This means that from schools to universities, JANET provides the Internet backhaul and a range of support services for the whole education community in Scotland.

#### How would you like to see your region develop? Where do you see it being in five years time?

We have recently run a successful Technical Briefing event in Aberdeen, attended by delegates from HE, FE and local councils. I hope to see this type of event taking place annually both in the north and south of Scotland.

After the transition of AbMAN to JANET we set up a local Technical Group, which ensures that local/regional issues and opportunities for local collaboration have a suitable forum for discussion and action. I think this approach will develop over the next few years.

The JANET Scotland website ([www.ja.net/scotland](http://www.ja.net/scotland)) has the potential to develop into the first port of call for any member of the JANET community to keep up-to-date with current developments within JANET(UK) and within Scotland in particular.

I would like to see JANET(UK), as a well established shared service in the public sector, continue to provide the support and type of services that our community needs and demands.

## LOFAR lightpath goes live

An international 10Gbit/s lightpath set up by JANET has gone live in the first operation of the LOFAR observatory. The LOFAR radio observatory at Chilbolton in Hampshire combined with stations in the Netherlands, France and Germany to take images of the bright radio quasar 3C196, located in a galaxy so distant that light takes 6.9 billion years to reach the Earth. In visible light, even through the Hubble Space Telescope, 3C196 is a single point: the combined international stations of LOFAR have already been able to reveal more structure.

To give an idea of the quantities of data that must be processed, the field of view that can be captured by LOFAR covers an area of the sky equivalent to 1000 full moons, and objects are studied with a resolution as fine as 0.2 arcseconds, close to 1/10000 of a full moon's diameter.

Images from the many stations involved are combined in real time at the University of Groningen to produce the final picture. The rapid and reliable transmission of data is therefore crucial to the operation.

It is expected that the Chilbolton site alone will be producing seven petabytes of raw data every year once LOFAR is fully operational. As well as the sheer quantities of astronomical data that must be passed on, because LOFAR does not rotate like a conventional radio telescope and must be configured electronically to study chosen areas of the sky, further vast amounts of computing power are required to keep its antennae synchronised to each other across countries so that the data gathered can be coordinated and formed into meaningful images. All this must travel down the JANET link without interference.



Professor Rob Fender, LOFAR-UK Leader from the University of Southampton, observes: "The connection between the Chilbolton telescope and the supercomputer requires an internet speed of 10 gigabits per second – over 1000 times faster than typical home broadband speeds. Getting that connection working without a hitch was a great feat requiring close collaboration."

## Edit your own Nameserver Enhancements to the Primary Nameserver Service



Enhancements to the JANET Primary Nameserver Service will help customer organisations' web resilience in the event of emergency and give greater ease of use to administrators, making them more responsive to their organisation's requirements and needs.

The main change is that organisations using the service can now ask for a secure web account that will allow them to edit their own zones, rather than having to send the request in to JANET(UK). This will enable administrators to change their zones quickly whenever they need to and schedule changes outside of normal working hours.

At the same time the interface brings two additional benefits for an organisation's resilience.

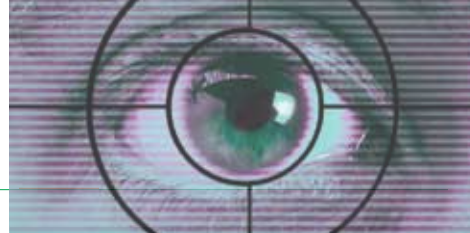
1. Backup primary nameserver. Through the interface, an organisation can run its own local nameserver with the JANET Primary DNS service running as backup. In this way the organisation will always have a current copy of its zone, and in the event that the local nameserver becomes unavailable, it can then log on to the Primary DNS service and make that the master server. This will then allow it to perform functions such as redirecting web traffic to an alternate site until the primary nameserver returns.

2. Automatic failover. This function is primarily intended for web servers and ensures a continued web presence, used in conjunction with a backup web site or the JANET Web Hosting service. If a site is down then traffic to the servers can automatically

be redirected to another site in a reasonably short time. The JANET Primary DNS Service can be set to monitor an associated IP address, and in the event that the monitored IP address becomes inaccessible, it could either drop the address or failover to an alternate address until the original address becomes accessible again.

Current subscribers to the Primary Nameserver Service who wish to enable the new enhancement should email [service@ja.net](mailto:service@ja.net) requesting access to the web administration interface.

Organisations that are currently managing their own DNS services, but would like to discuss how JANET(UK) could help with their DNS resilience plans, are invited to contact [ansg@ja.net](mailto:ansg@ja.net).



JANET Videoconferencing is just sitting there, ready to be used. The quality is so good. The ability to feed in content like video clips directly, in real time, and have it come out in real time too rather than jumping around like Max Headroom makes it a fantastic tool that people don't know about.

feedback there and then as people respond to what they're seeing."

"JANET Videoconferencing's value is in its remote accessibility and it makes financial sense. Say a BAFTA winner came to London for just a couple of days to accept his award. From his hotel suite he could speak to media students throughout the country. As all the sessions with our guest speakers were recorded, they are now available for universities to use as teaching tools. It is very rare that people in that position would have access to these types of speakers in real life."

"It was an overwhelmingly positive experience."

Ruth Palmer, Skillsset North Development Manager, said "We are really pleased with how well Due North worked. The videoconferencing was a great success and has been mentioned in many forums since, especially by the employers who were involved! The Northern Academies were all really positive about the experience of using JANET and really appreciative at having had the chance to be fully introduced to it within their departments. We are already working with them to look at how we can make better use of JANET as a network in the North."

Tim Marshall, CEO at JANET(UK), adds, "I had the privilege in one session to be a guest lecturer on a few pet themes on the future of media. From a presenter's point of view I too found it a truly stimulating experience. My thanks to JANET(UK)'s Paul Bonnett for his patient work to ensure this venture was delivered effectively."

## JANET meets Big Brother

Technoscepticism for a group of academics regarding videoconferencing changed to enthusiasm and a desire for more, with its recent successful use in a Skillset-funded training course. Academics involved in the course went from assuming JANET Videoconferencing was something stuck in a cupboard 'somewhere', which always broke down when they tried to use it, to seeing it as being a real enriching collaborative tool to support their teaching and the student experience.

Skillset, the Sector Skills Council for the Creative Industries is the industry body that supports skills and training for people and businesses to ensure the UK creative industries maintain their world class position. It recently helped fund Due North, a four-week course for young media professionals aimed at producing multiplatform content on a variety of public facing platforms. The content produced was mainly video-based but came in many different forms, including interactive, videoblogs, games and documentaries. Trainees were based at four campuses that have received Skillset Media Academy status – Liverpool John Moores University, University of Bradford, Teesside University and East Coast Media at The Grimsby Institute of Further and Higher Education.

The course was run by Endemol, the production company behind shows such as Big Brother. As part of an ongoing Media Training Initiative, Endemol trainers concentrate on ensuring the content produced on the course was delivered to a fully realised professional standard.

The four campuses were paired with nearby UNESCO World Heritage sites at which to produce their content: Liverpool John Moores University with Liverpool itself, Bradford with Saltaire woollen mill, Teesside with Durham Cathedral and Castle, and Grimsby with Fountains Abbey and Studley

Royal. As trainees were based over a large geographical area, a remote learning facility was set up to help them learn together. This included a dedicated website and two days of videoconferencing via JANET.

"It was a very, very good way of bringing everyone on the course together," says Endemol's John Paul Chapple. "We had speakers representing local employers, from Endemol and other professionals. The whole experience was extremely positive."

A major barrier to overcome was not so much technical as in the minds of the participants. "In media colleges," John Paul comments, "JANET Videoconferencing was viewed with suspicion and scepticism, by people who have never seen it work. Part of that is because sometimes they don't know it's there; part of it is it's seen as complicated. People are wary of getting lost in the technical detail. Instead they therefore set up bespoke systems by trial and error, or use Skype or a similar alternative which is much less effective and reliable. Meanwhile, JANET Videoconferencing is just sitting there, ready to be used. The quality is so good. The ability to feed in content like video clips directly, in real time, and have it come out in real time too rather than jumping around like Max Headroom makes it a fantastic tool that people don't know about."

He adds that "we couldn't have done it without JANET staff: they were fantastic at handholding technophobes like me and making contact with the relevant people within the universities."

Feedback from delegates on the course was very positive indeed and Endemol is already planning other courses. "In future, there are other aspects of the course which we could incorporate into videoconferencing. Feedback for work in progress and completed work, for example: we could show the piece of work to a number of people at a number of locations and have live



## From the wilds of **Borneo**

Highlighting videoconferencing's ability to eliminate distance barriers, it recently took a group of UK school children all the way to Borneo to meet an expedition team from the Natural History Museum hunting for fossil corals. The conference was part of a series run by the Natural History Museum in which over 300 pupils and teachers have now been involved, bringing pupils together with entomologists, botanists, zoologists, palaeontologists and mineralogists.

Using the Natural History Museum's Nature Live service, presenters work with scientists to interpret their research for a studio audience, facilitating interactive half hour sessions. Videoconferencing is used to extend this beyond studio visitors to a wider school audience. Grace Kimble, Schools Programme Developer at the Natural History Museum says, "videoconferences can be standalone activities – for example where schools are too far away for a day trip – or they may support a visit to the Darwin Centre to learn about how scientists work at the Natural History Museum." In this case, sessions were advertised using the museum's email list and the first ten schools to respond were chosen to work with the



project, with pupils ranging from Year 4 to Year 13.

Pupils first used the museum's Nature Plus site ([www.nhm.ac.uk/natureplus](http://www.nhm.ac.uk/natureplus)) to upload questions for scientists, with superb examples ranging from the practical ("where will you stay when you are exploring?") to the more strategic ("what do you hope to achieve by all of this?"), and not forgetting

health and safety ("what will you do when you get bitten by a poisonous animal?!").

Scientist Erica McAlister answered questions with honesty and a sense of humour.

Then in December the pupils linked to the expedition in Borneo. Lisa Bodenham, teacher at Woodlands Primary school commented:

"The videoconference allowed people who are experts in their field to provide immediate 1:1 responses to the children in my class. They were able to talk to people around the world in real time."

Grace Kimble says, "We have learnt a lot through the three sessions that have taken place so far, and over 300 pupils and

teachers have been involved. Thank you to all the schools involved. These sessions worked best when people were strict about muting microphones when they were not speaking – this is particularly important when several schools take part! Based on observation and evaluation, we aim to increase the amount of time for pupil questioning, and to work with scientists to demonstrate science investigations that pupils can carry out themselves."

Grace Kimble: [g.kimble@nhm.ac.uk](mailto:g.kimble@nhm.ac.uk)

Videoconferences for schools: [www.nhm.ac.uk/education/school-activities/gallery-characters](http://www.nhm.ac.uk/education/school-activities/gallery-characters)

## Benefits of Access Grid take to the road

Many staff at universities across the UK are unaware that their organisation has Access Grid videoconferencing nodes installed. They are however aware that sustainability and green issues are moving ever higher up their organisation's agenda. The Access Grid Support Centre launched the AGSC Roadshow in January 2011 to introduce staff at universities across the UK, whatever their role, to their local AG nodes; to demonstrate that there is no cost to the user in using them; and to show how the impacts of travel, both monetary and environmental, are reduced.

The Roadshow took the focus away from the technical aspects of the products and highlighted real life instances of how they are already being successfully used in universities, as well as giving information on the free services offered by the AGSC to users. Case studies showed how the advanced videoconferencing technology could be used for teaching, performance art, project management and facilitating distributed networks. Chris Clow of the University of Sheffield, where the event ran, also gave an overview of how AG facilities

at Sheffield are being used, and fed back to the AGSC that he too had discovered new ideas on ways in which the system can be used more effectively.

AG facilities at Sheffield are managed by a dedicated team led by Chris Clow and Ian Knowles, CiCS Learning & Teaching. Chris said, "We were delighted to be able to host the first AGSC Roadshow at the University of Sheffield. It gave us a great opportunity for other colleagues and external staff to see firsthand how using an Access Grid system can enhance your videoconference experience. The Roadshow emphasised how powerful the resource is, while also demonstrating how easy it is to use."

Delegates attended the event both in person and also over AG based at the Universities of Manchester, Durham and Nottingham, and Kings College London. Presentations were given from Sheffield as well as from the University of Manchester, where other members of the AGSC were located. All sites involved in the session used the AGSC supported commercial software, IOCOM.

Feedback from the day was very positive; one delegate who attended at the University of Manchester said that the event gave a "really interesting insight. As a non-technical expert it has certainly helped." Delegates at Sheffield were equally positive with feedback focusing in particular on what an important resource AG is at their organisation.

The AGSC is keen to promote existing Access Grid rooms to university staff around the UK. Since the Roadshow, Chris has reported back to the AGSC that Sheffield has already received a number of enquiries, run demonstrations and taken new bookings. The AGSC hopes to continue to introduce the technology to other new audiences, who we hope will go on to use the rooms set up in their organisations.

To find out more about future Roadshows, visit [www.ja.net/agsc](http://www.ja.net/agsc) or follow the AGSC on Twitter (@AGSC).



# Heads in the Cloud

UCISA Cloud Computing Seminar, 16 February 2011

Delegates from across the UK HE sector came together at Loughborough University in February for a seminar on cloud computing.

The need for and timeliness of the seminar became apparent as delegates gave their talks. Simon Daykin, CTO of Logicalis, cited Forrester Research: "Cloud computing is a sustainable, long-term IT paradigm, and the successor to previous mainframe, client/server, and network computing eras." Fred Clarke (Head of Research IT, University College Dublin) added in his talk that while the technology has always been here, it is now being put together in a different way: "it is a behavioural rather than technological change." And Loughborough's Network & Security Manager, Matthew Cook, said in his introduction that cloud computing is now a mature technology, ready to adopt.

Delegates were there to share experiences, to listen and to learn about technology and about behaviour.

## Definitions

The technology may be there and available but it is still fluid enough to be open to different definitions. Loughborough's Director of IT, Phil Richards, gave the first of several

definitions to emerge that day, this one provided by NIST: "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction." The 'shared pool' is the key phrase, he said: it is not the same as remote hosting with VPN where the user pays for connections – though computer systems which do just that are frequently sold under the name of 'cloud computing'.

David Wallom (Associate Director – Innovation, Oxford e-Research Centre) was more succinct: if a user must speak to a human to get service, that is not cloud computing, he said. Access to the cloud is through a computational interface and comes in three kinds (see box).

Andy Coulthard of the LSE pointed out that cloud computing is a commodity, like electricity: something that can just be turned on, with elastic capacity, focused on a service level, and the users just paying for that they need.

## Implementation

Although more and more organisations are moving to the cloud, everyone's

### The three flavours of cloud computing (David Wallom, Oxford University)

- IaaS (infrastructure as a service); e.g. Amazon Web Services, an infrastructure from which customers can requisition compute power, storage and other services.
- SaaS (software as a service); e.g. force.com and Google Apps, where applications that run in the cloud are delivered as a service.
- PaaS (platform as a service); e.g. the Windows Azure Platform, a place where users can then build their own apps.

experience is different; there is no one way of doing it and we have yet to reach the stage where the cloud is seen as the first choice, the de facto way of doing things.

Phil Richards cited a recent consolidation project by Hewlett Packard which managed to reduce its 85 data centres to just six, with an outlay of \$100 million leading to savings of \$1 billion p.a. (source: eweek.com). The lesson: it is only on an industrial scale that the savings of cloud computing really start to kick in. On that basis, he said, there needs to be a 'killer app' for HE and FE that will drive the



**Cloud building blocks  
(Simon Daykin, Logicalis)**

- Bandwidth availability
- Virtualisation technologies
- Automation tools
- High density data centres
- Innovative thinking

widespread process of moving to cloud computing. As yet there is no definitive offering, though he ran through a list of what it could be: a stack of research tools online? Shared administration applications? (Problematic, the processes of different universities being so diverse.) Cheaper virtual servers?

One thing that is for sure, he said, is that JANET can run as a national grid for a hybrid cloud which will be an IaaS that organisations can use as they will, provided they adhere to defined standards. JANET's growth model was driven by particle physics, he pointed out, which means that the capacity for running 10 data centres is already there.

Phil finished his talk with a list of ingredients for cloud success (see box).

Simon Daykin compared the cloud to the industrial revolution, transforming cottage industries into a widespread force. However, he also pointed out that the industrial revolution didn't happen overnight, and neither will this. An organisation can buy capacity in the cloud but it can't, or shouldn't, move everything externally all at once. It must get the right blend of on-site/off-site services, focusing on the deliverability and mobility of its IT service.

Simon listed the basic building blocks for a cloud service (see box) but said that the basic unit of cloud mobility is the virtual container: not an item of hardware but a concept in the mind. Every aspect of cloud computing can be broken down into compute elements, storage resources, network elements and security elements. Combining those into a virtual container

**Barriers to overcome (Fred Clarke & Ruth Lynch, University College Dublin):**

- Organisational and behavioural – existing culture gives people stability, security, understanding and the ability to respond to a given situation. Change causes people to fear that all those things will be lost to them.
- Technical – shortage of suitable vendors; inflexibility of big vendors; vendor lock-in; data security & privacy.

empowers an organisation in its thinking of how to move IT services around, for example between local hosting and remote hosting.

Simon described Logicalis's cooperative cloud offering, a hybrid style cloud with options for on site, off site, dedicated, shared and community cloud infrastructure. It is predictable and transparent, which enables its users to work to a service level agreement. The local aspect is delivered via mini-pods: individual cabinets which essentially take the IT environment and wrap it up in a package with cooling and power, which is deliverable on site. (He pointed out that a mini-pod only makes a saving if you can turn it off – otherwise you are just stuck with infrastructure, again.)

Fred Clarke and Ruth Lynch of University College Dublin described their recent implementation of a data centre, built five years ago to bring together servers from around campus. Cloud computing was chosen as the answer to some practical problems: high performance computing is very capital intensive; a physical cluster is inelastic – users sometimes need more resources than are available and adding resources can be slow; physical space can also be at a premium; pre-ordering hardware is capital intensive; cooling and buying compute time in other facilities can be expensive. However, there were still organisational barriers to overcome (see box).

**Ingredients for cloud success (Phil Richards, Loughborough University)**

1. De-risk with an IaaS hybrid cloud that combines local and remote facilities: using local cloud mini-pods avoids the cost of building a new data centre, and it is easy to have a rollback or exit strategy from the remote cloud if need be.
2. Incremental change through using virtual servers: your staff retain their jobs and an outlet for their skills, which removes that potential barrier within your organisation.
3. Ensure cost savings through an industrial scale remote cloud.
4. Use JANET as a national grid for remote cloud offerings. JANET has the advantage of already being in place, and could in future be acting as a broker on behalf of HE and FE for competitive deals.

Concerns about privacy and security of data were especially hard to overcome: researchers continued to believe that the US government would be able to access their data if it was stored abroad. Eventually it was decided that the hardware should be based within the EU as it was simply easier and more reassuring for data to be covered by EU data protection laws. The cloud offering is a hybrid of public and private, with Amazon providing the remote aspect – however, UCD still insists on data being held in Dublin, in the EU West 1A and EU West 1B availability zones. Nor is data stored persistently in the cloud: again, to meet the demands of researchers, the cloud is used only for computation.

David Wallom described the University of Oxford's programme to develop an integrated public/private hybrid cloud infrastructure for researchers, FleSSR (Flexible Services for the Support of Research). As well as being an existing resource that researchers can use, FleSSR is also a testbed and proof of concept

for further cloud developments. One aim of the project was to develop two trial use-cases as exemplars of developing management interfaces of swarms of VM virtual machines with different policies. The university found that while researchers want large amounts of storage, they also want it either locally or in a manner that is visible to them. Thus, part of the project was to provide an interface to flexible amounts of storage which researchers select when they log on. Effectively, to them, they have a resource on their private network with a choice of volume, interface type and policies on lifetime. Extending from this is the general lesson that the user can see a vast array of resources from cloud providers. Providers therefore need to be able to present everything through a simple interface that is uniform, open, standard and stays the same regardless of developments in clouds.

Matt Johnson of Eduserv immediately followed this talk, posing the question: why replicate a public cloud within education when we already have Amazon S3, a web services interface for storing and retrieving data on the web? S3 has a wide global reach and range of services, with hundreds of thousands of servers and a peak of 200,000 requests per second. However, Matt also drew attention to the drawbacks: hidden costs around i/o throughput and bandwidth; no guarantees on data durability; continuing concern around privacy of data and the US Patriot Act; and no (auditable) access to infrastructure or operations.

Eduserv intends to deliver a cloud service focused on education without any of these drawbacks, he said, building on infrastructure already available to the sector – that is, JANET and the UK federation ([www.ukfederation.org.uk](http://www.ukfederation.org.uk))

– and developing something that allows long-term planning and stability.

S3 has the advantage of being first-mover, with economies of scale and high margins. FleSSR uses the same strengths: its pricing model is comparable to Amazon Web Services and data is stored in a similar way, but the benefits of JANET connectivity bring down network usage costs. In short, Matt said, the viability of an education alternative to S3 comes in meeting the specific requirements of the sector; in integration with existing HE services; the potential for flexible business models; and costs comparable to S3.

#### Use cases

Not everything in the cloud is home-grown: commercial products are available and in use in the sector.

Ruth Charles and Jon Warbrick of the University of Cambridge described



**Main cross-cutting issues for implementing cloud computing (Andy Coulthard, LSE)**

- Business benefits
- Value for money
- Strategic fit
- Agility
- License models
- Key drivers
- More for less
- Increased return on investment
- New revenue streams

Cambridge's implementation of Google Apps for Education. Cambridge took this on because it wanted a university-wide calendaring system within a very diverse computer environment – each department at Cambridge chooses its own system, platform and policies. It was to be a limited deployment, just the Google Apps Calendar and contacts, accessed by the university-wide single sign-on authentication server.

Like UDC, Cambridge had to be satisfied on a number of points with its provider: data security; definitions of personal data; data transfer outside the European Economic Area and Safe Harbour principles; users' privacy and data processing; and the use of postmaster@ and abuse@ addresses (as initially presented, Google's terms allowed it access to emails sent to these addresses).

The contract that was eventually worked out between Google and Cambridge is available online for reference at [www.cam.ac.uk/cs/googleapps/google-apps-cambridge-contract.pdf](http://www.cam.ac.uk/cs/googleapps/google-apps-cambridge-contract.pdf).

The authentication system used is called gAuth. On first use it displays the Terms & Conditions of the service with a reminder that data is no longer held in Cambridge. It also handles provision of Google accounts for users through an API on the fly – it checks if the users have a Google account; if they do not then it

creates one; and if they do then it checks the account is up to date.

Alan Benson from the University of Aberdeen talked about Aberdeen's roll-out of Microsoft Live to provide email and calendar services. Overall the experience was positive, with benefits both expected (more email space; use of Windows Live Skydrive for data storage; reduced spam) and unexpected (academics started to find unexpected uses for the service). However there were also drawbacks in using a non-bespoke product: upgrades were introduced in line with Microsoft's priorities and there are occasional update failures. Overall, he said, while there are more maintenance and support queries – mostly from users – the service is more feature rich and provides an improved user experience.

Nick Skelton described the lessons learned when the University of Bristol deployed Get Satisfaction, a SaaS community support tool to develop a community page for Bristol Mobile IT ([askit.bris.ac.uk](http://askit.bris.ac.uk)). These were:

- Make it look like your site, but not too much, even if that means using their look and feel and just

your logo. This sends the signal that the site is subtly different to the regular university site and therefore expectation.

- The service needs to be integrated with your site and made findable. In Bristol's case this just meant putting a search box in the corner of its regular web pages.
- Remove barriers to entry: the system must use single sign-on, otherwise users will just give up.
- Build a sense of community to attract users: this may mean setting up a fake account or two!
- Be prepared to educate your supplier. The company behind Get Satisfaction found it hard to understand the university system for payment, involving cost centres and invoices. The company instead wanted to be able to bill a rolling credit card, as it would for a private consumer. It was eventually persuaded to implement billing after usage.

It is not possible to do all the talks justice in this short space. The full programme was:

- Hybrid Clouds and Mini Pods: Dr Phil Richards, Loughborough University
- FleSSR: Flexible Services for the Support of Research: Dr David Wallom, Oxford University
- FleSSR Business Models: Matt Johnson, EduserV
- Cooperative Clouds and Virtual Containers: Simon Daykin, Logicalis
- Google Apps at Cambridge: a case study: Dr Ruth Charles and Jon Warbrick, University of Cambridge
- The weather in Aberdeen is ... Cloudy of course: Alan Benson, University of Aberdeen

- Business Applications and the Cloud: Andy Coulthard, London School of Economics and Political Science
  - Quick and easy SaaS deployment: Nick Skelton, University of Bristol
  - Cloud Computing – UCD IT Services Experience: Fred Clarke and Ruth Lynch, University College Dublin
  - Experience of Running a Private Cloud: Steve Thorn, University of Edinburgh
- Presentations are available for download at [www.ucisa.ac.uk/en/groups/ng/Events/2011/Cloud/programme.aspx](http://www.ucisa.ac.uk/en/groups/ng/Events/2011/Cloud/programme.aspx). Videos of presentations are available at [www.ucisa.ac.uk/groups/ng/Events/2011/Cloud/videos.aspx](http://www.ucisa.ac.uk/groups/ng/Events/2011/Cloud/videos.aspx).



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## REPORTS

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[www.ja.net/six](http://www.ja.net/six)

[Quarterly Report to the Community, November 2010-January 2011](#)

[www.ja.net/services/publications/reports/quarterly-report/qr-winter10](http://www.ja.net/services/publications/reports/quarterly-report/qr-winter10)

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