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TechNews is a technology, news and analysis service aimed at those in the education sector keen to stay informed about technology developments, trends and issues.

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Networking and wireless

Analysis: Network Storage

Computing, whether at home, school or work, can generate huge amounts of data that needs to be securely and safely stored. The creative applications that so excite young people – for example video and music production are demanding on disk space; and as electronic data forms the basis for assessment the quality of storage services must continuously improve.

Hard disks are getting bigger. Currently a consumer-grade 1TB hard disk drive retails for around £100/\$200. This means that individual users have a great deal of capacity to use on their home computers and one of the challenges to network managers in schools is delivering appropriate storage options for the whole school.

Network or large scale solutions will normally involve some kind of fault-tolerant drive array. This will normally use a number of drives connected to a special controller that allows for RAID. RAID (Redundant Array of Inexpensive Drives) systems use multiple drives working in parallel. The controller manages data to guard against data loss. This might be through disk mirroring (RAID 1) or striping disk (RAID 0). There are other RAID combinations but these are the most popular. RAID 1 means that any data is written to two drives – therefore if one fails there is another copy. This means that for $2n$ drives, the total system storage capacity is n . RAID 5 uses a 'spare' disk and writes data so that it can be recovered from the information held on the other drives. This means for n drives of same size the system has a capacity of $n-1$ drives with the spare drive holding information that is normally redundant. Computers accessing RAID systems see only one drive and read/write to it as normal. The RAID controller handles the actual management of the data.

There are a number of benefits to externalising storage in this way. Firstly such systems are entirely designed to give reliable and speedy access to data with minimal operating system needs. Separating applications from storage means that if an application server is upgraded the data store can be maintained – this reduces the risk of data-loss and disruption to users. Large data stores can allow efficient sharing of resources. Multiple applications can use the same disks, making capacity and disk management easier.

The variations emerge in how these controllers are linked to servers. This might involve a LAN, a dedicated network or some kind of dedicated connection. DAS or Direct Attached Storage is where a storage array is directly connected to one or more servers. DAS arrays are not visible to the wider network and can only be accessed by the application servers they are directly connected to. This makes access to the data secure. The servers will normally be connected with a high-speed link, often Fibre. High speed fibre links in this model will offer around 10Gbps+ line rates, which equates to around 2000MBps in practice. The simplest DAS servers are just enclosures for drives and the access control is handled by the server and more complex units will load balance the requirements of many servers simultaneously.

DAS servers may be referenced by application servers as 'local drives' – so the only difference is they are physically external.

NAS or Network Attached Storage works in a similar way to DAS, but the NAS unit is connected to a LAN network, normally Ethernet. This allows storage to be added very quickly and easily to an existing installation. NAS boxes need to have some kind of network operating system on them. This might be a commercial system or it may be an open source solution like FreeNAS. NAS units will support one or more standard network protocols, such as SMB. Host computers to access stored data then use these protocols. A NAS unit on a network is not by default private to a particular application or server and is more designed for general purpose file storage rather than supporting application servers. Access speeds are normally limited by the network so commonly 1Gbps.

SAN or Storage Area Network combines these two approaches. This means it delivers network based file storage that appears to the client to be a local drive at similar speeds to DAS where fibre is used. This gives performance advantages and application compatibility but is more costly and complex. SAN is most commonly found in large enterprises who can afford the high initial investment. Where NAS implementations might be a single drive or small array, SAN systems are often large scale disk arrays and the largest storage units in the world. Large disk arrays, like large servers, may be virtualised. This means users do not access storage devices directly, but are presented with a part of the resource. This appears and functions as a separate drive but is easier to manage especially when the amount of storage needs to be varied. This could allow, for example, a large multiple disk/multiple server array to appear as a single drive or storage area to a number of users. These three solutions represent the alternatives available to a network manager who wishes to increase the resources available in his own direct management domain. In addition to being more physical drives, servers or disk arrays the manager could move the abstraction layer to include externally hosted services. The user will potentially see the same service (storage) whether the data was hosted on a drive in their own computer, on a school server, elsewhere in the local authority or potentially in the 'cloud'.

Manufacturers are increasing the efficiency and capacity of hard disk drives alongside other research into new methods – including 3D storage and increasing use of solid state drives. This will mean that the systems, behaviours and management issues will remain the same – irrespective of the underlying physical (or virtual) device.

When Google launched its Gmail service with 2GB of online storage developers were quick to write software that enabled registered users to use this as online storage. Despite not being officially supported at the time, this was the forerunner of a number of commercial services in this market.

Online storage options use the NAS concept to offer pools of storage that are available anywhere in the world. Companies such as BT offer home backup services. The Digital Vault offers a number of pricing plans aimed at consumers.

<http://www.digitalvault.bt.com/>

Companies such as Google, Amazon and Microsoft have massive server infrastructure distributed around the globe. Both these companies offer individuals and companies the chance to buy into this 'cloud computing' model. This means that for small unit costs (a few pence per unit) one can buy access to processor time and online storage. The ongoing costs can quickly mount up and there is a lack of direct control by the user – as, for example it is impossible to tell where in the world this data is stored, but there is unparalleled flexibility and access to services.

Consideration must be made of legal requirements when locating personal data outside of the UK so it might not be suitable for all applications.

<http://aws.amazon.com/s3>

<https://www.google.com/accounts/ManageStorage>

<http://skydrive.live.com/>

More 'professional' and assured services similar to these are available from other vendors. The cost of a service tends to reflect the quality of service offered in terms of data location and resilience. Many Cold War-era bunkers have found new purposes as secure underground storage hubs.

Cloud based computing offers a new way of delivering the whole spectrum of computer and data needs. Effectively everything except for a simple hardware client device could be moved out of the institution onto the network – where instead of buying software or hardware the cost is for computing power and storage on-demand. This has the advantage of global access but costs may be unpredictable depending on the contractual model.

For schools this gives a range of options. The core requirement for a normal school is unlikely to be high powered, speed-critical application servers. Rather the emphasis is on reliable storage that can be securely accessed from a range of clients, and backed up. The quantity of data being generated today has already outstripped the capacity of tape and CD-based systems that are only a few years old. There are however some important issues to be aware of – RAID disk systems do protect from individual disk failure, but if the unit was stolen or damaged then external backups are still important. High volume solutions at the moment could be based on Blu-Ray Disc but that would still require 20 disks for a 1TB store and this is not designed as a professional backup solution. 300GB+ disks are expected to be launched by InPhase but these are expensive. Tape solutions now offer up to 500GB per tape and operate at hard-disk speeds, making them still the best solution, though the backup upgrade cycle cannot be forgotten. Other backup solutions do exist.

There is no question that applications will continue to demand more storage driven by applications such as learning platforms. Institutions will, in the future, have more of a choice between self-provided services such as local disk arrays and external services that may be delivered on a revenue rather than capital basis. The technologies may change and capacity come down in price, but from a user or manager perspective this will not change the model or need for high capacity, high reliability storage services. Reliability will most often be achieved by moving storage

out of commodity servers such as those in individual schools and to a managed environment in a local authority or commercial environment.

Becta has published functional and technical specifications that are relevant to considerations of data management.

http://schools.becta.org.uk/index.php?section=lv&&catcode=ss_lv_pla_02&rid=11280
http://schools.becta.org.uk/index.php?section=lv&&catcode=ss_lv_pla_02&rid=11281

Networking and wireless news

WiMAX update

US telecommunications company Sprint has announced that it will launch its much heralded WiMAX service in Autumn 2008. The service will offer 4Mbps downstream and 2Mbps upstream potentially. Sprint also offers a home fibre service that expects to cover 12 million homes by the end of the year with 50Mbps downstream and 20Mbps upstream.

<http://www.itworld.com/sprint-nextel-to-launch-wimax-080618>

4G networks may either be based on WiMAX or on 3G LTE (Long Term Evolution) and there has been fierce debate over which standard will be adopted eventually. A number of key industry players have been increasingly vocal over possible mergers between the two technologies. Executives from Vodafone and Intel have recently been promoting co-operation and eventual merger. Competing systems face issues informing customers and delivering products to market so a unified approach is seen as the best way for the future.

LTE plans to offer higher speeds than WiMAX and there are some differences in detail, but there are also common factors. Manufacturer Motorola has suggested that 85% of WiMAX equipment design can be reused for LTE systems.

WiMAX is based on the IEEE 802.16 family of standards for delivering wireless broadband. 3GPP LTE (Long Term Evolution) is a project that is part of the evolution of the UMTS standard. The project will result in the UMTS version 8. Both technologies are expected to offer in the region of 100Mbps for mobile applications and 1Gbps for fixed wireless applications.

<http://news.bbc.co.uk/1/hi/technology/7425756.stm>

A barrier to providing wireless services is availability of spectrum. The European Commission has announced that the 3.4GHz-3.8GHz band will be available for WiMAX services across Europe which is positive news to potential suppliers. This spectrum will be open to fixed, nomadic and mobile networks – in other words unrestricted and in direct competition with 3G telecommunications data services. The alternative is to use the 2.6GHz spectrum but progress across Europe has been slow in allowing use of this space.

<http://www.arcchart.com/blueprint/show.asp?id=483&qtabs=99999>

Intel-backed WiMAX provider Worldmax has announced it will be delivering Europe's first Mobile WiMAX network in Amsterdam by the end of the year. The service is

expected to cost around €20 per month for unlimited data use. The challenge to the market is to judge the wider demand for these services if there is to be sustained operation and profit. The Amsterdam network uses equipment supplied by Alcatel-Lucent.

<http://www.worldmax.nl/>

Broadband update

The BBC has investigated the different broadband speeds available in practice across the UK. Working with Thinkbroadband.com they concluded that the average speed across two months was 3.2Mbps. Northern Ireland averaged only 2.2Mbps whilst London users saw 4.5Mbps. Regulator Ofcom concluded earlier in the year that geography makes comparatively little difference to service availability. These figures suggest that broadband is available widely but the detail of actual performance can still vary.

<http://news.bbc.co.uk/1/hi/technology/7431336.stm>

Ofcom have announced a Voluntary Code of Practice for the broadband industry that is aimed at increasing public confidence. This code suggests that providers should distinguish between the different types of speed – headline, access line, actual and average. ISPs have been generally criticised in the past by some consumer and interest groups for advertised speeds that are rarely experienced for any length of time – more theoretical maximums than actual service. One common specific complaint is the use of the term ‘unlimited’ where actually there are caps on monthly usage, though this is not addressed in this code.

<http://www.ofcom.org.uk/telecoms/ioi/copbb/copbb/>

Schools who benefit from the National Education Network are immune to these problems. The NEN is a closed, private network which does not normally suffer from any kind of congestion so the advertised speed should be reliably and consistently experienced.

Next-generation broadband in the UK

The government-sponsored Broadband Stakeholder Group has released a report suggesting that the benefit of adopting next-generation infrastructure will be in excess of £16bn. The report does not put a particular speed figure on ‘next-generation broadband’ but suggests it will be defined by services instead – fast enough, reliable, delivering multimedia and video conferencing.

http://www.broadbanduk.org/component/option,com_docman/task,doc_download/gid,1009/Itemid,63/

Ofcom’s Chief Executive has suggested that investment in networks will be matched by easing regulations and controls. This presents a key opportunity, not just for incumbent operators such as BT, but also large new entrants, to develop their networks.

<http://www.pcpro.co.uk/news/210519/ofcom-dangles-carrot-for-bt-fibre-investment.html>

BT has recently announced a £1.5 billion pound investment in fibre optic broadband services. BT claims that 40% of homes will be in reach of a high speed service by 2012, with 1 million homes directly connected to fibre. The plans are conditional on Ofcom changing the rules to allow BT to make more return on the investment.

<http://news.bbc.co.uk/1/hi/business/7506742.stm>

Dundee is set to see 100Mbps+ connections to residents delivered through fibre routed through the sewers. H2O Networks, the provider, commented how Dundee's high population density makes it ideal for deployments of this nature.

<http://www.vnunet.com/vnunet/news/2219526/dundee-scotland-first-high-speed-city-fibre>

Mobile data use increases

A survey by global industry partnership The GSM Association has shown that data roaming traffic – that is using a mobile phone for data whilst abroad – grew 75% between April 2007 and 2008. They attribute this growth to an increasing number of 3G subscribers and lower costs. The European Commission has been aggressively targeting pan-European mobile use and the previously high costs of roaming.

This development shows how as well as inexpensive broadband deals within a home country, the mobile broadband market is becoming universal. Mobile phone services are likely to come under pressure from alternative broadband sources such as WiMAX and this will likely drive even more competitive pricing.

http://www.gsmworld.com/news/press_2008/press08_39.shtml

Personal area networking

802.11-based Wi-Fi has become de-facto standard in a range of laptops and mobile devices. Intel is now pushing the spread of Wi-Fi into accessories and devices that might form a PAN or personal area network of linked devices. This places the technology in direct competition with Bluetooth. Intel is promoting the higher speed of Wi-Fi and the convenience of a single chip-set or approach across a range of applications. Commentators suggest this is at least partly driven by the comparative lack of market interest in Bluetooth in North America, in contrast with Asia and Europe where it is well embedded.

http://www.theregister.co.uk/2008/06/03/ozmo_intel_cliffside_bluetooth/

Global positioning data applications

GPS phone tracking for new data opportunities.

The most common application for GPS is location identification that is then linked to route finding. Researchers in the US are investigating how aggregated location data can be used in different ways. For example rather than concentrating on individual location they might look at crowd concentration, as evidenced through multiple GPS plots, to identify the most congested roads. This secondary data collection arguably removes any concerns over individual privacy.

The developers of CitySense for the RIM BlackBerry system suggest that a new kind of passive social networking scene may emerge if a system can compare your movements to others – discovering people with similar habits and interests for example.

Whilst not using GPS, this kind of crowd flow analysis could be used in planning the design of buildings. Schools especially suffer from small corridors that become very busy at certain times of the day. If pupil flow behaviour was a factor in timetable planning then arguably lesson transition could become much smoother.

http://www.technewsworld.com/story/63327.html?u=dley&p=ENNSS_88ea1a083ed351171d2bddb02dd31fb4&welcome=1213258460

Femtocell standard agreed

The standards body for 3G mobile services has announced an official architecture for 3G femtocells. This agreement means that standards can now be developed and products launched over the next twelve months. There had been competitions between vendors to see adoption of their preferred approaches but now the debate has stopped and the product design can begin in earnest.

Femtocells are small, relatively short range cellular cells that are used to improve coverage in a limited area – such as a home or office. This approach, using multiple short range cells is the alternative to larger, wide coverage cells. These small cells might be linked to the core networks using consumer-grade technologies like DSL broadband. This could provide a range of services, including using existing handsets as IP telephones when in range and replacing Wi-Fi hotspots in some markets. Femto cells will use less power than Wi-Fi.

<http://www.3gpp.org/>

Quantum encryption moves towards commercial reality

Security researchers across the world are hoping to bring quantum encryption products to market within the next two years. Quantum encryption is expected to offer absolute security as any attempt to intercept messages altering the message irreversibly. A UK consortium involving the University of Oxford and private businesses is creating the world's first commercial test facility in London.

A major barrier to adoption currently is the cost of equipment. The National Institute of Standards and Technology (NIST) in the US suggest that the most common approach to date requires four single-photon detectors each costing between £2500 and £10000 each. They are looking at more affordable alternatives.

Encrypted computer data may be a blessing for some users, but is likely to be unpopular with government and law-enforcement agencies who rely on signal intercepts to gather intelligence. In any case it is unlikely that such technology will be widely available soon. This technique is only suitable for communications and cannot be used to encrypt static or stored data. This kind of data must also be appropriately secured especially where personal data is involved.

The Cabinet Office recently published a report on data handling procedures in government which should be required reading to those responsible for data security in schools.

<http://www.londonquantum.com/>

<http://www.cabinetoffice.gov.uk/~media/assets/www.cabinetoffice.gov.uk/csia/dhr/dhr080625%20pdf.ashx>

Ofcom plans how to use newly freed spectrum

Ofcom, the UK regulator and guardian of radio spectrum, has announced the process it intends to allocate the spectrum freed up by the move to digital from analogue TV. In addition to improving the picture quality and range of channels, a move digital TV will also free up a large amount of spectrum. Ofcom refers this to as the 'Digital Dividend'.

The allocation of this spectrum will be based on a series of auctions. Ofcom have stated that the aim will be to "maximise the total value to society that using the digital dividend may generate over time" rather than being exclusively focused on revenue generation.

There are few restrictions on the applications for the spectrum that is freed up. It may be used for mobile broadband, for additional digital TV services or for mobile television – this will be a commercial decision for the successful bidder.

<http://www.ofcom.org.uk/consult/condocs/clearedaward/clearedaward/>

Ultra-low power processors

Sensors are becoming increasingly popular in a range of applications including medicine, surveillance and other types of pervasive computing. One issue with this kind of device is the power consumption and associated requirement for batteries.

Alongside improvements in battery technology, such as fuel cells, and personal power generation such as building solar cells in clothing; there is a drive to make these sensors use less power. Researchers at the University of Michigan have announced a new ultra low power chip that uses just 30 picowatts when in sleep mode. A picowatt is one-trillionth of a watt meaning that a watch battery could power such a device for over 250 years.

Embedded, pervasive computing has a whole range of applications. It is likely that sensors become more common, linked to hardware and software agents that can change behaviour based on the observed context. These issues were included in the TechNews article on Context awareness in May 2008.

<http://www.sciencedaily.com/releases/2008/06/080613174720.htm>

http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/technews/may08.pdf#networking

Multimedia

Analysis: Media Distribution

The internet is fast becoming the distribution mechanism of choice for all kinds of multimedia content. However, as users demand increasingly higher quality content, this increases the size of files and places demands on network capacity. This is partly offset by improved media compression formats, made possible with more powerful computers, but has also led to the emergence of a number of alternative approaches to distribution.

Most recently the focus of media distribution has been from TV companies who are offering customers the opportunity to 'watch again' using their home PCs or digital set-top boxes. Arguably the best known of these is the BBC iPlayer. The iPlayer is the brand for a number of different ways of watching content – the key computer based routes being a download service which uses peer-to-peer technology to allow content sharing and a streaming service based on Adobe Flash. The peer-to-peer approach includes Digital Rights Management (DRM) that means it is only compatible with the Microsoft Windows platform. The iPlayer is held responsible by many ISPs for a significant increase in bandwidth demands. iPlayer uses peer-to-peer technology to reduce the load on the central BBC servers – in this scenario once one user has downloaded content other users requests may go to that computer rather than the central hub. Whilst this saves on central resources it can mean that individuals end up using more network resources than they expect, which is relevant if they have an internet service which has monthly limits on usage. Many domestic broadband connections have a slower upload than download that can get easily saturated; and monthly quotas that may be reached without the user being aware. Downloaded material is stored on a local computer but protected with DRM and may have restrictions on when it can be viewed.

Many other UK TV channels offer similar software, normally using their own versions of this software. These include the SkyPlayer from Sky, 4oD from Channel 4, fivedownload from five and Catch Up from ITV. These services are expected to increasingly impact on the way people watch television and access material. On-demand access to material like this has great potential for education where programming can be used where relevant within lessons.

BBC Worldwide (the commercial arm of the BBC), ITV and Channel 4 are expected to combine forces into a single service, codenamed 'Project Kangaroo' which will bring services from all three broadcasters together into a single offering. It is not yet clear how this will work, but the mix of DRM-enabled download, peer-to-peer and streaming for non-Windows devices is likely to remain.

Peer-to-peer is not the only method for companies to deliver online content. Since the advent of large scale online software distribution a number of companies have emerged to offer download management services. For example a request to download a large file from a website is passed on to a geographically convenient software or media store. This has benefits for the content owner as it reduces the bandwidth he needs to offer or buy; and for the user more 'local' downloads are often quicker. This is effectively a mix between peer-to-peer (between the content stores)

and download (between the content store and the end customer). Apple is a significant user of this technology and other companies working in this space include Akamai.

Other online distributors are using the network, but operating tighter control over the files themselves. This reduces the requirement for DRM (as redistribution is controlled) and opens a range of possible user experiences. For example movie rental firm Netflix is to use domestic broadband connections to download content to dedicated set-top boxes in consumer premises. These boxes will be tightly controlled and designed to link to televisions rather than home computers.

From a network management perspective the two solutions covered above, download and peer-to-peer are relatively straightforward. No matter what model is used it is fundamentally about discrete data connections from point to point, where each stream represents an instance of a programme or some part. There may be some management of where the download originates from, but beyond that – data is data.

The focus of peer-to-peer, from a content provider, is to reduce the load on the origin server. Without this a popular programme or live stream can quickly overwhelm even the largest network. An alternative approach is to re-engineer the network using an approach called multicast. Multicast works by building additional functionality into network equipment, so when multiple users request the same content the network will only replicate streams at the last minute. For example, if five users on the Virgin Media network request the same content from BBC server in a multicast scenario – one stream only passes between the BBC and Virgin Media, then the routers only replicate the data at the last possible moment where connections are no-longer shared – thus maximising efficiency. In a unicast network there would be five streams all the way to the BBC servers – despite the duplication in the content and hence waste of bandwidth.

However good this sounds, there are only limited implementations of multicast because of the complexity of configuration. In UK education the JANET network used by universities and schools as part of the National Education Network has some implementation of multicast.

<http://www.webarchive.ja.net/development/multicast/index.html>

There is no doubt that growing use of large amounts of data, perhaps driven by multimedia raises a number of challenges to schools and education users. For example a class group accessing the same multimedia material could easily saturate a link unless contingency plans are put in place.

The most common is to use a media-aware cache at the edge of a school's network. These devices bring some of the benefits of a multicast network at least inside the LAN. The cache, acting as a proxy for network requests, will make one copy of the content from the outside world and pass this on to multiple clients inside the LAN. This can easily save a significant amount of bandwidth in some situations if properly implemented. Inside a LAN such as a school's network there may be multicasting

from the proxy server. In large schools with complicated networks this can be beneficial.

The majority of the press surrounding peer-to-peer networking has focussed on illegal file sharing activities. These are often quite difficult to detect as software can use a range of different network IP ports and can look like normal data traffic. A number of network administrators have been caught out by large-scale illegal file sharing operations 'hidden' on legitimate networks. The examples above show how peer-to-peer has legitimate uses, but the network manager must remain vigilant to unexpected traffic increases and characteristics such as high load out of normal working hours; that might point to inappropriate activity.

Commercial ISPs make extensive use of traffic monitoring software and some may use traffic shaping to prevent such uses affecting large numbers of other customers. For example some ISPs have informed home customers that if they download a large volume of data inside core hours the maximum speed of their service is reduced. This traffic management is normally inappropriate for LAN users, but for local authority, regional and national networks it is receiving increasing attention.

In school it is important to have a clear policy on the use of software, especially that that can create legal but inappropriate peer-to-peer media stores. If an institution has a policy then it is legitimate for network managers to look at the network in a structured and planned way – ensuring that all users have a fair share of the network to support their teaching, learning or administration. Schools are responsible for copyrighted material that is on their networks so have a duty to be aware of what their resources are used for.

Looking forward, data networks are likely to be more extensively used by broadcasters. This includes on-demand media distribution as described above but also using 3G data networks for mobile TV services and more generally moving TV distribution to IP based distribution networks but using set-top boxes rather than computers as clients. The current generation of networks do not offer enough bandwidth to replace broadcast TV for all customers, but compression algorithms are improving as capacity increases, so this may become more prevalent in the future. Arguably the general trend of broadcasting is towards on-demand content and this may eventually replace traditional scheduled programming. This is to some extent heralded by media portals that allow customisation with users able to build a homepage from a range of possible information channels.

Education could be a key market to benefit from developments in on demand media distribution as material can be incorporated into lessons more easily when required rather than driven by broadcasters or fumbling with recorded media – but this requires effective, well designed distribution networks.

Multimedia news

Intel Video Search

Increasingly the internet is about distributing video. In contrast with text it is hard to automatically search and catalogue. A number of companies are working in this field – amongst the best known is UK/US company Blinkx which analyses the audio component of video to match content with search queries. Technology giant Intel has announced that it is exploring video search that uses image recognition algorithms on each frame of a video. This will be very processor intensive but is hoped to yield good results when it finally reaches commercial reality.

<http://www.blinkx.com/>

http://www.intel.com/pressroom/archive/releases/20080611corp_sm.htm#highlights

<http://www.itworld.com/intel-developing-video-search-080612>

Future of E-paper

The global interest in electronic paper or e-ink solutions continues to work towards large-scale affordable solutions. Education will be a key market for products as a well-known consumer of often-bulky textbooks across a range of subjects.

Fujitsu have demonstrated a concept Fabric PC that would use electronic paper displays to give a very flexible, low-power consumption device that looks like a laptop but is much more flexible.

<http://gizmodo.com/341138/fujitsus-fabric-pc-and-three-other-forward-looking-concepts>

Polymer Vision has announced a colour rollable display device that is expected to use 3G networks to update its content. The first generation is expected to launch in the US later this year.

<http://www.readius.com/>

Mass market applications are clearly expected. Manufacturer Plastic Logic is building a new factory to produce flexible multi-purpose displays. This kind of commitment to manufacturing volume is a good guide to expected market penetration. 10"-12" displays are expected to reach market in volume later in 2008.

<http://www.plasticlogic.com/>

From the supplier and publishing side, O'Reilly media have announced they will be selling ebook bundles, without DRM control at a lower price than physical books. These bundles will contain PDF, EPUB and Mobipocket versions. The latter is compatible with the Amazon Kindle e-book reader.

<http://www.amazon.com/Kindle-Amazons-Wireless-Reading-Device/dp/B000FI73MA>

<http://toc.oreilly.com/2008/06/select-oreilly-books-soon-on-kindle-and-as-drm-free-digital-bundle.html>

Large display news

Media giant Comcast has paid \$22m for a huge display that uses 10 million four-millimetre LED lights. This giant screen is five times HD resolution and is based at their centre in Philadelphia. The custom unit is powered by 27GB of data.

This leaves school-based projectors in the shade, but does demonstrate the future potential to turn whole sections of buildings into rich multimedia interactive displays that could enhance the immersive learning and experiences.

http://dvice.com/archives/2008/06/this_is_what_10.php

Slightly more affordable is a new 108" LCD TV from Sharp. The LB-1085 is designed to meet the 1080p HD TV standard which uses 6.21 million pixels to deliver 1920x1080 resolution. This device is aimed at corporate offices and boardrooms rather than homes but does show how the technology is scaling to deliver increasingly large displays which will eventually cascade down in price and application.

<http://www.sharpusa.com/about/AboutPressKits/0,1108,795,00.html>

Philips Electronics have been showing off WOWvx displays that use new technology to deliver 3D viewing experiences without the need for special glasses. The displays, aimed initially at the entertainment and corporate industries rather than homes, work for multiple users at once. The technology works by projecting multiple images so that each eye receives a slightly different picture – which is then combined by the brain.

http://www.research.philips.com/technologies/display/ov_3ddisp.html

<http://www.business-sites.philips.com/3dsolutions/news/article-14922.html>

Handheld games console highlights for education

A number of schools and education institutions across the world are looking at using consoles to deliver education in a innovative fashion. Clunbury Primary School in Shropshire has received an award from Becta for its innovative use of MP3 recorders, blogs and podcasts as well as Nintendo DS consoles in teaching and learning.

<http://www.clunbury.shropshire.sch.uk/>

Learning and Teaching Scotland have established the Consolarium for investigate games and learning. The centre is based in Dundee and will be looking at different types of games and platforms. It is hoped that using games in this way will engage and stimulate young people within a context they understand.

<http://www.ltscotland.org.uk/connected/articles/16/embracinggamingculture/>

In Tokyo's Joshi Gakuen all-girls junior high school Nintendo DS consoles are being used to support learning of English. The consoles are being used alongside traditional teaching and learning to support spelling learning.

<http://www.chinapost.com.tw/asia/2008/06/26/162821/Nintendo-DS.htm>

Video and graphics hardware update

Alongside computer processors the key area of fast-paced development is with graphics chips. These power the latest games and other visualisation and processing applications. Nvidia has announced a new processor that is the largest they have ever produced. The GeForce GTX 280 uses 1.4 billion transistors to deliver 933 gigaflops of performance – almost double that of the previous generation. This is a powerful processor that is designed to do more than just provide simple screen graphics – but rather become a second processor for the computer as a whole – taking load off the CPU. Like all such advances however it requires special code that will take advantage of the capacity. This chip offers the ability to run high-end vector processes that were previously only found on specialist high-end processors.

http://www.nvidia.com/object/geforce_gtx_280.html

Video is a powerful tool in the hands of young people and with easier distribution comes a range of new devices. The Flip-Mino portable video camera is a single unit that offers 640x480 digital recording in an easy to use and compact case. Relatively low-cost devices like this can offer young people of all ages an introduction to digital creativity.

http://www.theflip.com/products_flip_mino.shtml

Digital-only future for radio proposed

The UK's Digital Radio Working Group has reported to the government and suggested that analogue radio should follow analogue TV signals and be switched off in favour of digital solutions. Digital TV signals will replace analogue by 2012 but radio is likely to last at least until 2020. Digital transmission uses less radio spectrum, freeing it for other applications, and can offer better quality. However digital radio, such as DAB, has failed to attract the levels of interest seen in digital TV.

Regulator Ofcom's approach to the use of the spectrum released by the removal of analogue TV is covered elsewhere in this issue of TechNews.

http://www.culture.gov.uk/reference_library/media_releases/5216.aspx

BBC iPlayer ambitions

The BBC Director General Mark Thompson has hinted to the Financial Times of his ambitions for the corporation to move its on demand services from the online world to the TV. The BBC iPlayer which offers catch-up TV is available online and through cable TV operator Virgin Media could, under these ideas, be the foundation of a content-neutral standard set-top box that gives viewers a high degree of personalisation and control.

Home computers offer the same functionality that is proposed but the idea is aimed to appeal to those who do not use computers in this way, or have not moved them to the living room and the family television set.

http://www.ft.com/cms/s/0/5a10899e-43af-11dd-842e-0000779fd2ac.html?nclick_check=1

The next version of the iPlayer, to be launched soon, will extend the functionality of the software into new areas. In addition to better video performance (from 512 to 640 pixels wide) it will include advanced personalisation opportunities and being in other content and widgets, using the RSS content feed format.

<http://www.macworld.co.uk/digitallifestyle/news/index.cfm?newsid=21807>

Google ordered to share YouTube records

A US court has ordered Google to hand over the YouTube access log to Viacom. Google is being sued by Viacom for copyright infringement. The log files will contain details of the clips, the IP address of the computer and user ID used. Viacom claimed that it identified 160,000 unauthorised clips of its material, accounting for 1.5 billion views on the site. The log files are expected to be around 12 terabytes of data.

Privacy activists are concerned about the sharing of this personal data as part of a lawsuit and it is unclear if Viacom intend to follow up this larger action with specific proceedings against individuals. This is the latest in a series of actions to reinforce ownership of copyright materials and has lessons for the operators of any networks that they should take a great deal of care over material stored on their networks.

<http://ap.google.com/article/ALeqM5qFJIDFx4LzK1pGKWT0NpWqkN-6mQD91MIVO00>

TV not voice expected to drive telco business

The traditional backbone of the telecommunications market – fixed line voice calls – is dwindling in importance to many providers as they take advantage of new technology to offer alternative premium services such as broadband, mobile telephony and TV services over the networks.

Analysts at In-Stat suggest that 60% of revenue over the next five years for telcos will come from mobile services. By 2012 broadband penetration is expected to be around 10% in developing countries and 85% in the developed world. In 2008 revenue from Pay TV services is expected to surpass revenue from fixed voice services and by 2012 broadband revenue will also be close to fixed voice service revenue.

<http://www.instat.com/abstract.asp?id=272&SKU=IN0804000WWI>

Growth in 3G mobile TV

3G mobile TV services have been touted by many operators as the ‘killer-app’ to drive demand for handsets and data services, though to date customer interest has been more reserved. Analysts at In-Stat suggest that today 3G penetration is less than 50% for most operators with less than 10% subscribing to mobile TV services. This equates to around 6 million subscribers in 2007, but by 2012 this is expected to reach 42 million.

TV production and broadcasting are expected to change dramatically over the next few years. The growth in control over viewing – through Digital Video Recorders (DVRs) and online players such as the BBC iPlayer will allow users to construct their own viewing rather than rely on scheduling. Such developments support mobile access – where the phone handset simply becomes another access device to the programme material.

<http://www.instat.com/press.asp?Sku=IN0804054MBS&ID=2331>

Hardware

Analysis: Ultra low cost PCs (ULCPC)

Over the last 5 years the notebook computer has changed from an expensive corporate tool to a consumer device, driven by lower costs and the place of the home computer moving from the study to the living room. This portable computer market has developed into a range of different devices from larger desktop replacements to smaller ultra-portable devices. Smaller devices have commonly been a premium product and manufacturers such as Sony have concentrated on design as well as function. This has recently changed with a number of manufacturers investigating how portability can be combined with low-cost to suit mass- and emerging- markets such as education in the developing world.

An emerging label for these products is ULCPC (Ultra-low cost PC). These products hope to create new notebook markets that compete against smartphones and PDAs/handheld computers as much as traditional notebooks.

The ULCPC market did not emerge from the ‘traditional’ large PC manufacturers that dominate the corporate computing market. Manufacturers such as HP, Acer, Sony and Dell have only recently announced products that will compete in this space. Sony has for years offered premium ultra-portable Vaio notebooks but these are currently competing in a different market. Instead two main forces – hardware innovators in the Far East and the OLPC project, have driven the ULCPC market.

These low cost machines were originally aimed at the developing world and education, but the surprising success of the Asus Eee PC in consumer markets has demonstrated latent demand for inexpensive, limited machines for mobile use. These generally complement higher specification machines, providing an extra device for the family or for travel, meeting the needs of the modern multi-PC household. The attraction of this large consumer market has prompted many manufacturers to offer low cost models, increasing competition and innovation.

The One Laptop Per Child (OLPC) project has been influential in setting a challenge to innovators. The project was set up to create and distribute laptop computer costing \$100 to developing countries for education purposes, based on the idea that personal ownership supports learning and connecting to the world using ICT will help every person and community. The project has a commitment to deliver nearly 700,000 XO-1 units (June 2008). The intention was to reduce the prices to \$100 but currently the price is around \$188 per unit. This device is currently based on Linux

but a version using a variant of Microsoft Windows XP is also available. The XO-1 uses a range of innovative technologies to keep the size and weight down and was an early adopter of solid-state storage instead of a traditional hard disk drive. The XO-1 is to be replaced by the next generation XO-2 in 2010, which aims to cost \$75. Intel has been working on a similar class of device called the Classmate.

One of the first consumer devices to get significant market attention was the Eee PC by Asus. Asus are a Taiwanese company that are focussed mainly on producing components that are sold separately to hobbyists or to systems integrators who package parts from a number of companies together into a badged unit. It is estimated that a third of PCs sold in 2007 used an Asus motherboard but the company brand is still relatively unknown to consumers. The first generation of the Eee PC was launched in 2007 and has been followed with a number of different devices varying the specification. The basic Eee PC retails from around £200/\$300.

Other manufacturers in this market currently include VIA, Acer and MSI, amongst others. Chip manufacturer Intel has been a significant proponent of these devices and has developed specific chipsets aimed at mobile devices. Intel has been pushing concepts of UMPC (Ultra Mobile PCs) and MID (Mobile Internet Devices) for some time, but these have arguably been aimed at the connectivity-rich developed world and mass-markets rather than education or with an emphasis on price.

Whatever the device, there are a number of key characteristics. Screen size is small compared to normal notebooks. The most common size is around 7" diagonal though larger screens are becoming available, such as the new 8.9" Eee PC 901. Screens are often a significant part of device cost and as worldwide manufacturing capacity and demand vary the costs can change. The weight of devices is kept low to encourage users to keep them on their person at all times. An Eee PC weighs around 1KG and the OLPC XO-1 1.5KG. Weight is also important for education markets where young children are being targeted. Battery life can vary with these devices as batteries tend to be smaller than on full size laptops. They are designed to be usable for around 2-3 hours between charges. The use of energy efficient storage, such as SSD, can improve battery life. There are other devices in this form-factor – such as the HTC Shift, but these are commonly much higher cost premium products.

ULPCs are a natural partner for open source software to help keep prices down. The first versions used variations of the Linux operating system but Microsoft has announced it will support Windows XP on these devices until 2010. Windows XP will only be supported on low specification devices and this is not intended to be a general extension to the lifespan of the operating system. The requirements of Microsoft Windows Vista are beyond these devices.

The OLPC XO-1 was originally designed with a user interface called Sugar. This was expected to be an integral part of OLPC systems but has more recently been announced as a standalone project. It uses a graphical desktop that is focussed more on task than on structures/filing systems.

<http://www.sugarlabs.org>

There is a small range of alternative processors for a ULPC. Intel has been promoting its Atom processors which are aimed at offering low-power consumption. Alternatives include VIA Nano and NVIDIA's Tegra. Tegra is primarily aimed at a range of devices including portable media players but may find a home in the ULPC. The XO-1 uses an AMD Geode chip. All these manufacturers look to volume sales of these low power devices. VIA has launched a reference design known as Openbook. This uses the Nano processor and is designed to be copied by other companies who will build their own ULPC devices.

http://www.via.com.tw/en/resources/pressroom/pressrelease.jsp?press_release_no=2347

The ULPC is a new market, however it is not without competition. It competes with more premium products such as clamshell smartphones, PDAs and 'normal' laptops. Some of these offer built-in connectivity with mobile networks (smartphones) while laptops offer much larger screens suitable for longer term use. As its name suggests though, the ULPC can offer a low entry price in addition to portability but there is always compromise involved. However, in many situations 'good enough' may suffice. Education is a key market for these devices and the low cost is seen as a way of encouraging mass market adoption, such as one device per child in schools.

The market itself is expected to grow. IDC forecast 10 million sales by 2012 but this is small compared to the whole PC market which is expected to see a growth in personal ownership of notebook computers. Market growth of notebook computers will likely reduce costs and put pressure on ULPCs from above.

Devices themselves are expected to be able to increase their flexibility and power. This will be delivered through decreasing component costs alongside technology improvements.

It is generally thought that personal ownership of equipment has a role in increasing educational opportunity, especially when linked to pervasive broadband networks and home access. Equipping a majority of learners with their own devices will create additional administration and management overhead, but should offer new learning opportunities across the curriculum.

Hardware news

ULPC update

The market for ULPCs (Ultra Low Cost PCs) is getting increasing interest from major computing brands. As noted in this month's Analysis the market was mainly started outside of some of the well known mass-market brands, but these companies are now entering the market.

Alongside new products from Asus, following its successful Eee PC with the 10" Asus Eee PC 901, there are offerings from Dell, HP and Sony. There is also a new OpenBook reference design from Via using its Nano low-power chip.

The Dell mini-Inspiron has been announced by the CEO Michael Dell, but few other details have been released yet. HP's 2133 sub-notebook UMPC is available already. It has an 8.9" screen, uses a hard drive for storage and runs Linux. It is more expensive than the Eee PC and arguably priced more as a laptop than a ULPC. HP, alongside an expected similar device from Sony, use Via rather than Intel chips. Intel has been keen to promote its Atom chip as the perfect mobile processor but there is a developing market in alternatives. Acer's equivalent of the Eee PC, the Aspire One will be using Intel's chip. Chip manufacturer Nvidia has also announced a processor aimed at these devices but there have been no announcements of products using this Tegra chip so far.

<http://gizmodo.com/393815/exclusive-dell-mini-inspiron-their-first-mini-laptop>

<http://gizmodo.com/357994/hp-compaq-2133-umpc-laptop>

<http://news.idg.no/cw/art.cfm?id=47DD4F69-17A4-0F78-317EE59E8BC29E94>

<http://news.bbc.co.uk/1/hi/technology/7430768.stm>

<http://www.acer.com/aspireone/>

Processor update – Intel and AMD

Intel has launched the latest version of its Atom processor. This processor is designed for low-cost devices such as Mobile Internet Devices (MIDs), Ultra Mobile PCs (UMPCs), Ultra Low Cost PCs (ULPCs) and Netbooks. There are currently two types of Atom. 'Silverthorne' launched earlier this year is only available as a single-core chip and is aimed at the lower end of the market – where power consumption is key. The latest, codenamed 'Diamondville' is available in single and dual core and is a more powerful chip for units where batteries are larger or for low-cost desktops. The next generation of Atom, currently codenamed 'Pineville' is expected in 2009.

<http://www.intel.com/atom/>

AMD has announced four new chips as part of its quad-core Opteron SE range of processors. These processors are aimed at the business workstation and server market. Both AMD and Intel continue to put more cores on individual chips that give multi-processor performance easily. However applications must be able to take advantage of parallel processing opportunities in order to gain best use.

http://www.amd.com/us-en/Corporate/VirtualPressRoom/0,,51_104_543~126379,00.html

Intel has dominated the mobile PC market with brands such as Centrino that were developed specifically for the mobile marketplace. AMD's response includes the Puma platform that matches its Turion CPU with ATI mobile graphics. This is hoped

to target the portable business graphics market and the growing interest in laptops as general-purpose gaming and home entertainment devices.

http://www.amd.com/us-en/0,,3715_15692,00.html

Universal power adapters

Almost every household, office and school shares the same problem of trying to manage a huge range of different power adapters and connectors to convert AC to DC supplies. Consumer electronics maker Westinghouse Digital Electronics has launched Green Plug which is a new power management chip that uses so-called intelligent power supplies to ensure devices are only charged when they need it as well as simplify the number of cables. Based on the Mini USB connector format they hope to simplify the requirements on device producers and customers as well as reducing wasted power and therefore being more sustainable.

As with all such ideas the proof will be in adoption and interest from major consumer goods producers.

<http://www.greenplug.us/index.html>

Mobile phones – software and applications

Apple has announced the next version of its popular iPhone. The iPhone has achieved significant market penetration. The main criticism was the lack of 3G support, commonly seen in competitor's devices. Apple has addressed this with a cheaper updated version that includes 3G and GPS along with improved battery life. Developers are also able to produce software for the device and sell it through the Apple App Store.

<http://www.apple.com/iphone/>

Microsoft's next mobile operating system is expected in 2009, when it launches Windows Mobile 7. This is expected to include better support for touch-based applications.

<http://www.microsoft.com/windowsmobile/en-us/default.mspx>

A report by airline IT provider SITA and Cambridge University suggests that mobile phone handsets have a role to play in efficient communication to travellers. By analysing the cause of delays, commonly including travellers getting lost or confused by changing gates, the researchers suggest that using handsets to communicate or track location could save £300m a year.

Mobiles are increasingly finding applications such as this and for years have been touted as a possible mechanism for micropayments for example at vending machines.

http://www.sita.aero/News_Centre/Press_releases/Press_releases-2008/SITA_research_shows_mobile_phones_have_potential_to_save_the_industry_600_M_on_flight_delays.htm

Consumer electronic reliability research

A new report from research and consultancy firm Accenture has explored the myth surrounding returns of consumer electronics. A survey found that only 5% of goods returned were actually faulty; 27% were customers changing their mind and 68% were customers having problems with configuration and operation.

The research also references earlier work that estimates consumers allow only around 20 minutes on average to make a device function before they give up. As hardware and software get more complex this places huge challenges on developers to ensure that usability and accessibility are key to design. This is before consideration of users with disabilities or other special needs.

The strategies presented in the report to offset returns are also valuable when considering the role of training and user education in the deployment and use of any hardware or software in any situation, including education where new products are relatively commonplace.

http://www.accenture.com/NR/rdonlyres/694BD9A9-C44D-49F0-8C1D-1DEF4EC44332/65720/IndustrializedRepairsPOV_F0108lr.pdf

Super computing

Manufacturer IBM has unveiled the new world's fastest computer. The computer, codenamed Roadrunner cost \$133m and is expected to peak at 1.7 petaflops (1 petaflop is 1000 trillion floating point operations per second). The computer contains 12,960 Cell processors (based on the design used in the PlayStation 3) and 6,480 AMD Opteron dual-core processors. It is expected to be able to perform a range of applications including financial modelling, weather analysis and simulating the decay of nuclear material.

IBM already has in development computers expected to exceed the power of this unit, but Roadrunner is the first computer to break the 1.0 petaflop barrier. Blue Gene/Q is expected to reach 10 petaflops when it is completed between 2010-12.

This contrasts with the 60th anniversary of 'The Baby'. The Small-Scale Experimental Machine, also known as SSEM first ran a program on June 21st 1948. This computer is widely regarded as a forerunner of all modern programmable computers and was followed in 1951 by the world's first commercial computer.

<http://www.computer50.org/mark1/new.baby.html>

<http://www.research.ibm.com/bluegene/>

<http://www-03.ibm.com/press/us/en/pressrelease/24405.wss>

Eco-friendly plastics

Mobile phone giant Samsung has unveiled new handsets that are designed to be environmentally friendly through the use of corn rather than petroleum-based plastics in their manufacture. Increasingly companies are being environmentally aware to respond to consumer demand and there is also an economic reality over the increasing price of oil.

Corn based plastics have typically suffered from poor strength but the solution marketed by Samsung in its W510 and F268 handsets is to mix the two types together to get a reduced cost coupled with flexibility and strength. Such plastics are already widely used in applications such as carrier bags and disposable cutlery, but up to now they have not been widely found in consumer electronics

http://wireless.itworld.com/4267/samsung-corn-phone-080616/page_1.html

3D memory developments

As demand grows for solid state memory devices to replace hard drives and for consumer electronics, manufactures are looking for ways of increasing performance and capacity. The current generation of technology is benefitting from improved production techniques that increase capacity, but a step change is required to reach much higher performance. SanDisk and Toshiba have agreed to co-operate on the development of rewritable 3D memory chips where storage components are arranged differently to improve longevity, performance and capacity. Currently technology cannot reliably deliver the manufacturing quality required for the mass-market. However if these products finally reach market then it will be a real change for the quality available to the consumer.

<http://www.sec.gov/Archives/edgar/data/1000180/000095013408011311/f41579exv10w1.htm>

Self-replicating manufacturing machine

3D printing and component construction are not new, especially to schools who have been using CAD/CAM tools for many years. However engineers have demonstrated the first 3D printer that is able to replicate itself – that is reproduce all the components required to build a copy of itself. The unit cannot actually assemble a clone, but this is a low cost min-production facility.

Self-replicating devices are a staple of science-fiction and some projections of catastrophic disaster, especially where nano-scale machinery is involved; but this is far less threatening and indeed could be of great interest to schools and hobbyists as the parts are thought to cost around \$600.

<http://www.reprap.org/bin/view/Main/WebHome>

Sonic-cloaking material proposed

Following on from recent experiments that bent microwaves around an object, effectively rendering it partially 'invisible' to that kind of radiation, researchers in the Journal of Physics have announced a theoretical sound-cloaking technology. Using a new material they have developed, they can bend sound waves around an object. Using different thicknesses of the material should be able to affect different wavelengths of sound.

The material could have a range of applications – from shielding rooms from noisy neighbours to stealth submarines. In a school it could allow soundproofing of key rooms or spaces, allowing noisy activities to co-exist with quiet working.

<http://news.bbc.co.uk/1/hi/sci/tech/7450321.stm>

Software and internet

Analysis: Web Mashups

Originally the World Wide Web was created to deliver relatively static content. The uses of the technology have grown with the increase in users and web content has increasingly become multimedia and interactive. From the internet's focus on interoperability have emerged standards-based approaches to interaction between sites, sharing data and functionality to deliver innovative and sometimes unexpected services. These new web applications are known as 'Mashups'. These are focussed on combining data from two or more sources, via a web interface, to deliver a new or value-added outcome.

A range of web applications have emerged recently, fulfilling a number of functions. Perhaps one of the best-known types is web mail applications such as Microsoft Windows Live Hotmail or Googel mail. This has been extended with a number of other online applications that enable easy collaboration with a focus on anytime anywhere access rather than locally installed applications. Perhaps the most popular current example is Google Docs.

These web applications are self-contained. That is the same site with a single operator provides the application, the data store and any other add-in functions. Mashups take this concept of web application and separate these components to allow different organisations to provide different parts of the user experience. This can have a range of outcomes, such as linking photograph data stored on one site with map data stored on another – giving the outcome that photographs can be explored and navigated by their geographical location on a map. This kind of data visualisation is the most popular application. This is different from a static content mashup where a number of different media objects, such as music and video, are remixed together.

This approach is made possible through the use of standard approaches and developers making public their API (Application Programming Interface). The API sets out the behaviour of applications when given a particular command. For example a command may be passed to a map application to return the map of a particular area that can then be further processed.

There is a key difference between a mashup, where data is processed and returned according to parameters passed and simply embedding web content (such as an externally hosted picture or video) where there is no processing. Mash-ups are populated with data in real time when the serviced is accessed, maintaining currency whereas embedded content must either be updated while maintaing resource identifier or only ever represent a snapshot.

A Mashup will contain three core components. These are the content provider; Mashup site and client web browser. The content provider is one of more sites that provide the APIs that are used to deliver the new web service. The Mashup site draws together the different APIs and offers the new or innovative service. The client web browser is the user interface to the application and data. Mashups are linked to

the concepts of Web2.0, where content and services are highly personalised and user generated; and the Semantic Web where the links and data-exchange between sites and applications are pre-eminent.

The first mashups were created using manual coding, based on understanding of API documentation mixed with creative ideas for applications. However as public interest has grown so a number of content providers and internet companies have developed mashup editors that allow less-technical users to create custom mashups. Intel Mash Maker, Google Mashup Editor, Microsoft Popfly, Google and Yahoo! Pipes offer graphical interfaces to work with popular data sources and bring them together. There is no substitute for more detailed coding solutions in more complex mashups, but this software works well as an introduction to key concepts.

<http://www.popfly.com/>

<http://pipes.yahoo.com/>

<http://mashmaker.intel.com/web/>

<http://editor.googlemashups.com/>

The current generation of mashups are delivering a relatively small set of services. These are around maps and integrating geographical data – using Google Maps and similar; photo and video content – supported by tagging-based sites like Flickr; search and shopping sites – bringing together keyworded data and linking it together to add value; and news sites that link information automatically together based on content. Mashups tend also to be free and are driven by user-needs. The typical closed-source business model of focussing on the value of the application has somewhat been replaced by open-source or community defined applications using data that has commercial value instead.

It is widely appreciated that humans are superior to computers in drawing links, connections and themes between apparently disparate data. Databases revolutionised information management by giving users tools to sort, organise and create relations between information in the same domain. Mashups are arguably a development of this and give people the ability to bring together different data sources dynamically to serve analysis.

Creating a mashup can be considered a demonstration of rapid application development. Therefore in addition to educational outcomes or learning from mashup outputs the creation and use process can be considered modern software development.

The power of this approach will come with easy access to the mashup creation tools for users. If users have the skills and tools to create their own views on data there will potentially be an explosion in small, ad-hoc task based mashups being created that allow data to be linked in new and exciting ways. It is difficult to predict exactly the results this will deliver, but the ability to integrate and link ‘tagged information’ with other ‘tagged information’ in an easy way could be very influential. The first place this approach is likely to be seen is in enterprise MIS/data functions where

there are specialists in place who are used to analysing and interrogating data, but as with anything linked to the internet larger scale appeal is likely to follow.

There are applications beyond data visualisation. For example the bkkeepr mash-up uses the Twitter notification service combined with database information drawn from online booksellers to allow users to track their progress reading books. The results are then displayed in the mashup application online.

Online retailers such as Amazon have huge catalogues of books. Another book-based mashup is LazyLibrary. This can perform searches for books on particular themes that are under 200 pages long. This shows how mashups can effectively deliver customised database searches easily, especially when combined with a graphical editor.

Another education-based mashup example can be drawn from the Open University. Academic Tony Hirst has created mashups that allow cross-searching – that is searching one database based on keywords drawn from another. A specific example is a tool to search the links specified in course ‘further reading’ for specified terms.

<http://blogs.open.ac.uk/Maths/ajh59/010112.html>

Education is potentially an early adopter of custom mashups. The curriculum encourages students to look at how different topics and approaches work across subjects and mashups support this kind of holistic thinking. The most powerful visualisation tools currently available to these users are map-based. Using a combination of mapping and multimedia information it is relatively easy to explore a range of different issues creatively using mashups – for example looking at cliffs on a map alongside freely available photographs, or exploring cities virtually.

In business the mashup is gaining credence as a way of combining data and services in new ways. In addition to data presentation, as discussed above, composite business applications can be created using API-based web services. This is about introducing processes to the data elements considered above. The focus of the mashup then becomes bringing together different application processes and services rather than being data focussed. Despite much interest from press and analysts this ‘community/standards’ approach has yet to replace the massive industry of bespoke systems integration.

For those interested in learning programming and the workings of the internet, mashups and editing tools this is an effective rapid prototyping system with a focus on output and user experiences.

Software and internet news

Microsoft Windows XP lifecycle changes

Despite the launch of Microsoft Windows Vista, many customers have been reluctant to upgrade from the previous version – Microsoft Windows XP. Vista has a higher

minimum required specification to take advantage of many of the improvements in the software. A number of companies, such as Dell, have been offering customers XP on new machines instead of Vista (using downgrade rights for business versions of Vista), despite this operating system now being seven years old.

XP was officially withdrawn from general sale on June 30th 2008 but Microsoft have announced that manufacturers of small, low-powered ultra-portable PCs will be allowed to install it until at least June 2010. This reflects the growing market for that kind of device and the unsuitability of Vista for this kind of device.

For normal customers Microsoft will support XP with paid support, patches and updates until 2014.

<http://www.microsoft.com/presspass/features/2008/apr08/04-03xpeos.mspx>

Virtual and streaming application delivery

Network managers continue to be offered a range of products to make it easier to work with and deploy new computing resources. Thin client computing has been around for many years and continues to enjoy a significant minority of deployments in the real world. This concentrates computing power on central servers and lets users access resources using low-powered clients. Originally these servers would be single devices but virtualisation technology has grown in maturity and is now found in a number of situations. Virtual servers can be easily deployed and managed with their resources increased or decreased as required. The combination of thin clients and virtual servers means that users can be given their own, apparently dedicated resources to complete tasks based on an organisation's priorities.

Thin client vendor Citrix has announced the latest version of its Xen Desktop software. This stores a complete PC as a virtual machine that can either be downloaded to a desktop computer or run in a thin client model from a server. No matter where this is executed a user can see the same applications and in a controlled environment that cannot be modified without permission. This mixed-mode of delivery (central server or local execution) addresses one of the main criticisms of Thin Client – that when there is powerful local hardware it is not used

VMware has upgraded its application virtualisation software. Instead of packaging a whole operating system and environment, ThinApp is based on individual applications. So, for example, a user can run Microsoft Internet Explorer 6 and 7 on the same computer – whereas normally the installation of 7 overwrites an installation of 6. This is also an easy way of deploying new applications.

Microsoft is also active in this area. They have acquired developers Softricity who specialised in delivering packaged applications across a network. This not only allows distribution of whole installations of software but also allows applications to be 'streamed' across the network, thus minimising bandwidth requirements and allowing users to get started with applications rather than waiting for a large download.

<http://www.citrix.com/english/ps2/products/product.asp?contentID=163057>

<http://www.vmware.com/go/thinapp>

<http://www.microsoft.com/systemcenter/softgrid/default.mspx>

Internet naming change proposals

ICANN, the central internet domain register that oversees the structure of an internet address, has approved radical new changes in to level domains. The top level domain is the last bit of an internet address and is either a global grouping such as .com .org or .info; or a country level designation such as .uk .de or .ca. The board of ICANN has voted in Paris to relax the rules and potentially open up the creation of new top level names.

The proposal that has been agreed is to invite declarations of interest from applicants as to what these new top level domains should be, rather than a general free-for-all. This list will be considered and then final changes agreed by the ICANN board in 2009. The new system will also include, for the first time, non-Roman characters.

<http://www.icann.org/en/announcements/announcement-4-26jun08-en.htm>

Firefox breaks download records

Microsoft's Internet Explorer dominates the web browser market, but alternatives such as Mozilla's Firefox have strong followings. The latest version of Firefox, version 3, has been released and over 8 million downloads were recorded in the first 24 hours. This new version includes an updated layout engine and increases that standards compatibility of the software. Firefox is free and easily extensible – many users install add-ons such as local dictionaries, ad-blockers and utility software such as IRC and FTP clients.

Analysts estimate that Internet Explorer is slowly losing ground to other browsers, dropping one percent over May to 73.8%. Firefox has grown to 18.4%, showing the huge lead Microsoft has.

<http://www.techworld.com/applications/news/index.cfm?newsID=101655&pagtype=al>
!

<http://www.mozilla.com/en-US/firefox/>

Apple Mac update

Apple has announced that the next version of the Mac OS X operating system software is expected to be launched in spring 2009. The next version of OS X, 10.6 codenamed Snow Leopard, is expected to focus on improving the speed and efficiency of the operating systems rather than being radically innovative and introducing new features.

OS X is a Unix based operating system and is available for older (Power PC) and recent (Intel) based Apple Mac computers. It is not clear whether OS X 10.6 will support older hardware or if it will be restricted to post-2006 Intel hardware.

Mac OS X is well regarded as being a low priority for virus writers and therefore faces different dangers than Microsoft Windows PCs. This is at least partly due to the comparatively low-volume of users. A small number of Mac viruses have been identified by vendors, including Sophos.

<http://www.apple.com/macosx/snowleopard/>

<http://www.sophos.com/pressoffice/news/articles/2008/06/machovdyA.html>

Cloud based computing services as utilities

There is growing interest in a range of cloud based computing solutions. Cloud based computing involves computers accessing massive, shared computing resources and paying on a per-unit basis for the storage, processing power or bandwidth used. This is used by supply companies to maximise the benefit of their investments (for large database operators such as Google, Microsoft and Amazon) and the benefits for users are on-demand resources that are accessed when required and do not require initial capital investment and potential wastage.

Cloud computing has potentially low local requirements for hardware. This often means extending the life for old PCs but manufacturer Cherry Pal has launched a new ultra-low power desktop computer that will only consume 2W of power and has 80% fewer components than a standard PC. It is expected to be launched in August.

<http://www.treehugger.com/files/2008/06/cherrypal-2-watt-green-computer.php>

<http://cherrypal.com/>

Citrix Chief Executive Mark Templeton predicts a strong future for this approach, which is aligned with his company's products that provide software to access remote servers. Publishing and multimedia software giant Adobe has launched Acrobat.com, named after its flagship product. This site allows users to use an online word processor called Buzzword (similar to Google Docs), create and share content with others.

<https://acrobat.com/>

Google has opened early versions of some of its online services to testers. It has a range of planned enhancements to its Gmail online email service and has chosen to make these available in a pre-release state to users. As with all test software there are no guarantees of performance or integrity but it highlights the innovative nature of the company. Google has been offering its Gmail and application suites to institutions as a way of outsourcing key applications. <http://mail.google.com/>

Web 2.0 update

Web 2.0 techniques, where sites provide infrastructure and tools for users to add and share content are growing in use in many areas.

The University of Minnesota has released details of a study of young people over six months where they observed the benefits of use of Facebook, MySpace and other online applications. The investigators concluded that using these sites helps young people develop useful skills around communication, collaboration and design that are relevant in later life.

http://www1.umn.edu/umnnews/news_details.php?release=080619_3591&page=UMNN

The CIA, the US spy agency, has begun early operations on a suite of applications it calls Intellipedia. At its core this is a number of different installations of the MediaWiki software that runs Wikipedia, complemented by other social software with equivalents of YouTube and del.icio.us. The content is separated into 'unrestricted', 'secret' and 'top-secret' classifications. This shows how wikis and social software can be used within closed communities for specific purposes – such as project working and team-sharing.

<http://www.ciocentral.org/entry/intellipedia-the-intelligence-wikipedia/>

Beyond the current generation of Web 2.0 applications, one possible future is the machine-processed Semantic Web. This will be a future where online information is usable by computers, rather than just people, and the results will be displayed to users from many sources according to preference – rather than the choice of the developer.

City University in London has been given a grant of £1.5m to research technologies in this area from under the Technology Enhanced Learning Programme. As well as City University, partners include the Centre for Applied Research into Educational Technologies at the University of Cambridge and the universities of East Anglia, Essex and Stirling.

http://www.city.ac.uk/news/archive/2008/06_june/12062008_3.html

Cost of personal web use at work estimated at £10bn

CBI says staff using the internet for personal surfing is the modern-day tea break. Personal internet use at work costs the UK economy £10.6bn a year – but it is probably money well spent, according to research by employers group the CBI.

New research from the employers organization the CBI estimates that personal use of the internet by workers costs the UK economy £10.6bn per year in time. However, the tone of the research is not dismissive of this time spent and compares it as the 21st Century equivalent of the tea-break. Companies often ask workers to sign ICT acceptable use agreements limiting or excluding personal use of the network but it is widely accepted that these agreements are widely flouted.

54% of organisations report that they restrict internet access at work, 14% deny access completely to staff and 25% have no limits on access. 32% of respondents have disciplined an employee for internet misuse in the last 12 months; and 13% of organisations have dismissed an employee for persistent abuse.

<http://www.computing.co.uk/computing/news/2218667/personal-web-costs-uk-plc-10bn>

US high school hacker faces jail

Two high school students in the US have been charged with a range of offences after hacking into their school computers, allegedly using a Trojan programme that hides malicious code inside seemingly-innocent software. The two boys used the

assessment system and improved their grades. One of the boys, Omar Khan, faces a total of 69 charges with a maximum penalty of 38 years in jail.

As more information is stored online there needs to be an increased emphasis on security. Common mistakes that are made include leaving terminals logged in with administrator or teacher rights and passwords being written down.

http://www.orangecountyda.com/home/index.asp?page=8&recordid=914&returnurl=index.asp%3Fpage%3D8%26pagenumber%3D2%26pagesize%3D12%26deptid%3D%26archive%3D0%26sl_month%3D0

Security scanning survey exposes flaws

Security company Sophos has announced the results of its latest Sophos Endpoint Assessment Test. This is a free online scanning service that checks PCs for vulnerabilities and key security software patches. Audit tools like that can be useful in quickly determining system management priorities.

The results of this assessment found that 81% of corporate endpoints checked failed the test, giving an idea of the scale of the potential issues. This covered 583 computers, 36% of which were from the UK. Keeping up to date with patches is a challenge to network managers and easy deployment on many clients may be performed most efficiently with some kind of remote management tool.

<http://www.sophos.com/pressoffice/news/articles/2008/06/endpoint-vulnerability-results.html>

TechNews Information

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