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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: Cloud computing

At a glance

- Reliable access to powerful online computing facilities enables organisations to procure processor and storage capacity on the basis of predictable costs.
- Suppliers can provide online services via the cloud.
- Such services provided 'in the cloud' transfer risk to service providers, while achieving economies of scale and flexibility of access.
- Users of cloud services still need to consider security, data protection, backup and business continuity.
- Effective, synchronised offline-online working is becoming widespread through cloud services.
- A range of new and blended services of interest to educational establishments is emerging.
- Cloud services could create one route to enabling parental access and providing mobile access to staff and students.

Defining the cloud

Cloud computing embraces a fundamental shift in the computing model enabled by pervasive, reliable internet technologies. This shift allows users to access remotely managed services and applications without the overhead of maintaining a significant local infrastructure. In the past, services or resources provided via the internet were represented in structure diagrams with a cloud symbol - somewhere 'out there' was a large server farm that held the data and applications, but the details were not immediately relevant to the process being described.

Most people use some form of cloud-like application every time they use their home computer, whether that be a search engine, a video service like YouTube, or webmail. However, there is no universally accepted definition of the cloud. For example, where does it reside physically and what facilities might it offer? Does it include servers hosted by an employer or public service organisation accessed through remote protocols? Does the cloud actually consist of the infrastructure or just the resources and services provided?

Gartner has defined cloud computing as: 'a style of computing in which massively scalable IT-related capabilities are provided “as a service” using internet technologies to multiple external customers'. This definition does not include the infrastructure and software technologies, such as virtualisation, used to offer the service. The cloud allows users to access services over the internet without any need for local infrastructure, apart from web connectivity and some form of internet-enabled device, such as a PC, netbook or mobile phone. Other descriptions of cloud computing include the back-end hardware and virtualisation technologies used to deliver scalable services.

Software as a service
In Gartner's scenario, providers may offer data storage, backup or security services, host desktops and applications defined by customers, or run programs to provide a business function. The last of these, often termed ‘software as a service’ (SaaS), is particularly appropriate to geographically distributed functions, such as e-commerce, managing a field sales team, web conferencing, or niche applications that can compete more effectively by aggregating demand across international markets.

BT research reported by Silicon.com suggests that 60 per cent of companies that have adopted SaaS have seen a reduction in costs, whilst half report time savings. Merrill Lynch predicted in May 2008 that 12 per cent of the global software market will have transferred to the cloud by 2013, creating a sector worth $95 billion.

Utility computing
The cloud also enables utility computing services: businesses purchase gas and electricity from utility companies - why not computing resources too? Companies really need the ability to store and process data, not large amounts of hardware which may be under-utilised and costly to maintain and replace. Data connections have become much more reliable and provide greater bandwidth for lower cost, so it should be possible to lease processor time or data storage by the unit from a third party, without having to worry about where the data is held, or the details of the hardware on which it is maintained. For example, Amazon's Elastic Compute Cloud (EC2) and Simple Storage Service (S3) provide public pricing structures and a calculator tool so that users can estimate the cost of these services. Microsoft announced in October a new 'Windows Azure' branded offering that will be released in beta next year.

Many large-enterprise IT suppliers have announced a range of partnerships and new facilities to research supporting technologies and offer cloud services in recent months. These include AT&T, Dell, eBay, Google, HP, IBM, Intel, Microsoft, Oracle, Sun, VMware and Yahoo, as well as vendors of open source solutions.

Much of the published analysis, and therefore terminology, is based on commercial adoption of SaaS, utility computing and other cloud applications. Nevertheless, the issues faced by schools and colleges are largely similar.

Reasons to use cloud services
Providers of cloud services can:

- manage underlying hardware to provide reliable, scalable services
- ensure high utilisation levels for infrastructure by aggregating demand
- centralise expensive resources and expertise
- test, deploy and manage software updates on behalf of clients
- reduce the environmental impact of IT systems through scale efficiencies and centralising resources into purpose-designed facilities.

Users of cloud services:

- access existing and innovative services via a range of internet connected devices
- outsource procurement, management and replacement of infrastructure
- outsource technical support and maintenance functions
- quickly adjust processor/storage availability according to demand
- lease processor power and storage capacity for defined services and limited duration projects - charges may be per user, or based on a function processor power per unit of time, gigabytes transferred, gigabytes of storage allocation, or some other metric
- predict IT costs based on known lease arrangements rather than on assumptions about hardware lifecycles and future costs
- regain physical space that can be used for other purposes.

Considerations when moving to the cloud

Users of cloud services must:

- plan carefully for migration of applications and data into the cloud, to ensure business continuity and correct replication during the transfer
- ensure that connectivity to the cloud provides adequate 'received' (rather than advertised) bandwidth for anticipated demand, using suppliers that can offer appropriate levels of availability and reliability
- ensure that lease arrangements provide for changes in bandwidth demands, capacity overruns and comprehensive backup strategies
- accept loss of direct control over system management, backup and other functions
- consider whether independent backup arrangements are necessary for business-critical data
- be aware that system outages have affected large well-known suppliers of online services and provide other means to ensure essential business continuity
- assure themselves that suppliers have adequate policies to cover system failure and that these procedures are followed - one supplier, The LinkUp, recently failed to protect customer data from system failure and subsequently closed all its services
- investigate whether a single point of failure could be critical to service continuity - theft of telecommunications equipment from exchanges in Docklands left customers without network services in September
- consider supplier lock-in - what will happen if the provider goes into administration? How easy would it be to change providers? Would data be difficult for an alternative supplier or contracted third party to access, due to legal restrictions or use of proprietary formats and protocols?
- plan adequate data security, especially in the light of consumer fears reported by Pew Internet; who manages access to data and how much fine control do you have over that access? How is the network protected from malware and security threats? Which data should be encrypted?
- consider who owns data hosted by providers and the legal rights to use or cross-licence content imposed by some consumer-focused services

- examine data protection arrangements for personal data, especially where providers may host applications, store data or subcontract services to companies operating under different legal jurisdictions
- ensure, if a public sector organisation, that financial and other data held in the cloud meets requirements for audit and other sector-specific constraints.

Education systems
Management information systems (MIS) and learning platforms are being offered via the cloud or may feature some cloud-based services. Such services may allow teachers to update assessment data at home, provide parents access to 'real time' reports on attendance, or give students access to learning modules on mobile devices. Functional requirements for MIS and details of authorised Learning Platform Services Framework suppliers can be found on the Becta website.

A number of schools and higher education providers, including Cottenham Village School and University of London's School of Oriental and African Studies (SOAS), are using Google's online applications as part of a blended approach to institutional administration and communication. Microsoft hosts the LGfL email system via its Live @ Edu service and Yahoo's Zimbra also offers email and collaboration tools for education.

Half-way solutions
Hosted systems may permit a degree of offline working in order to account for connectivity failure and the needs of mobile workers. For example:

- Google's Gears software is a small application that is downloaded to a PC, enabling users to continue working with browser-based Google Applications and other specifically written web software while offline.
- Adobe AIR permits users to run purpose-designed web applications directly on the desktop without a browser.
- Photoshop.com, also from Adobe, provides online storage and editing software to complement the offline applications.
- Zoho has offline support for its Writer application.
- Yahoo's Zimbra provides offline editing and synchronisation for web email, calendars, contacts and basic document editing.
- Microsoft Live Mesh provides an online desktop interface that can synchronise offline folders with online storage, while its Office Live Workspace provides sharing and online storage of documents created using standard applications. In October the company announced that it is developing 'lightweight' online versions of Word, Excel and PowerPoint to support its Office products.

Some education developers have followed a similar route, for example WriteOnline from Crick Software consists of a browser-based educational word processor that can work offline, with documents synchronised to online storage. Charging is based on a subscription model that covers storage and all automatic software updates.

Conclusion

The ‘cloud’ has become the technological buzzword of the moment, but behind the hype it offers a computing model that has the potential to provide IT services that can be accessed through the internet, based on predictable costs, freeing educational establishments from the need to plan for, maintain, support and replace significant portions of the infrastructure. Most of the issues that remain to be resolved (such as security, reliability, control and continuity) are not unique to cloud-based services - only the location and relative importance have altered. Cloud computing does pose different levels of risk (especially for mission critical services) so, if considering adoption, the issues around passing control of data to third parties, continuity of service and reliance on connectivity will need to be carefully considered on a case by case basis. Some of the technologies are immature and capacity is still being built, so most institutions are likely to be selective in their choice of available services, depending on strategic priorities, inherent risks and readiness to adopt innovative models.

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Live @ Edu http://www.windowslivelounge.co.uk/edu
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WriteOnline (Crick) http://www.cricksoft.com/uk/writeonline

Networking and wireless news

Cloud computing developments

Many companies are stepping into cloud computing - offering massively scalable IT facilities and services using internet technologies. (See analysis piece above.) Microsoft announced at its Professional Developer Conference in October 2008 that it would make some its internal platform technologies, used to run its 'Live' services, available to third parties under a new 'Windows Azure' brand. Developers will be able to host many new and existing applications written using Microsoft's .NET tools within Azure, as well as deploy content across the internet through Microsoft's SQL and SharePoint Services environments. Azure will initially be free under Microsoft's Community Technology Preview programme, but long term pricing will be built on a usage model.

Amazon already has a web services model based on user consumption, known as the Elastic Compute Cloud (EC2). Previously, this was considered a beta programme, but an October announcement brought a defined service level agreement (SLA) for business customers that includes a 99.95 per cent availability guarantee in each 'region'. (Amazon currently has just one 'region', but expects to add more. Availability to end users must also take internet connectivity into account.) The announcement included availability details for new, beta Microsoft Windows and SQL Server 'images', which will offer support for ASP.NET, ASP.NET AJAX, Silverlight and Internet Information Server (IIS) technologies. Existing images include OpenSolaris (based on Sun's Solaris operating system), Ubuntu's Linux and variations of Oracle's database products. A number of open source content management and wiki products are among the other applications available.

Google has also attached a 99.9 per cent uptime promise as an SLA for its Premier Edition customers. The guarantee - which covers Gmail, Google Docs, Google Calendar, Google Talk and Google Sites - refers to periods of unavailability of more than ten minutes, with additional days credited to the customer's service period, depending on the percentage of downtime during any given month. This promise does not appear to apply to the Education Edition.

IBM has launched a whole range of cloud products and initiatives over the last two months, including a beta social networking and collaboration service aimed at businesses. Bluehouse 'allows individuals to share documents, contacts, engage in joint project activities, host online meetings and build social networking communities via the cloud through a web browser'.

Windows Azure and the Azure Services Platform...
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LTE/WiMAX update

LTE and WiMAX are two of the main technologies competing to replace '3G' mobile services, following a development path through 'pre-4G' to approved 4G (fourth generation) status. Initial Mobile WiMAX products are being based on the 802.16e-2005 standards agreed in 2005, while the 3GPP's Long Term Evolution standard (LTE) 'release 8' is expected to be finalised later this year. LTE is designed as an upgrade path to the 3G technologies already deployed in many developed countries, whereas Mobile WiMAX will initially provide mobile broadband services in these areas. Typical pre-4G download speeds are expected to be substantially faster than recent '3.5G' HSPA data connections, but depend on factors such as distance from the base station and the number of users sharing the available bandwidth.

Sprint launched its first commercial city-wide US XOHM WiMAX service in Baltimore late in September, with planned roll-outs to other cities including Chicago and Washington DC. Tariffs are based on daily or monthly charges, with no contractual tie-in, as the focus is on mobile devices connecting to the internet. Users are expected to add a PC card or modem to their device or purchase compatible notebook computers, mobile internet devices (MIDs) or, eventually, phones with embedded WiMAX. Sprint claims that download speeds experienced by customers will 'ultimately' reach 2-4Mbps. The success of this service will be carefully watched by other operators as they decide which technology to choose for advanced mobile broadband services.

In the UK, Nottingham Trent University is creating a 'WiMAX Forest' across the city, based on masts sited in two schools, which is expected to have begun service at the end of October. Intel has invested in the project, seeking to understand the effects on signal propagation of buildings and geographical features. The partners, who include other local groupings, are interested in seeing the new opportunities exploited by local schools, businesses and community organisations.

During the WiMAX World show at the start of October, Fujitsu Microelectronics and Cisco were due to demonstrate video streaming between equipment from multiple manufacturers, to establish that the underlying standards do indeed achieve interoperability. The base station was designed by Cisco and a USB dongle and transmitters in chipsets from third party developers came from Fujitsu. A WiMAX web camera was to be among the equipment on show. The demonstration was also designed to show that adaptive 'beamforming' (to optimise signals) works in the real

world, using the multiple-input multiple-output (MIMO) antenna technology inherent in Mobile WiMAX.

Samsung and ETRI demonstrated 'WiMAX evolution' technology at the ITU-R meeting early in October. This system increases potential WiMAX speeds four-fold by improving efficiency of frequency allocation to multiple 'spatial pipes' within the MIMO antenna array using Multi-User MIMO techniques. Samsung, which hopes to have equipment ready for commercialisation in 2011, suggests theoretical WiMAX evolution download speeds of up to 149Mbps.

Nortel and T-Mobile demonstrated the validity of LTE technology by broadcasting signals to and from a moving vehicle during September. The 4km test track in Bonn, between buildings on the banks of the River Rhine, included more than one base station cell to demonstrate that 'handoff' between transmitters was effective. T-Mobile had previously demonstrated download speeds up to 170Mbps, although these rates are far above what would be expected from mobile devices in daily use.

XOHM WiMAX broadband service debuts in Baltimore
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Samsung and ETRI demonstrate world's first live 'mobile WiMAX evolution'
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World's first successful live test of the next generation of mobile communications
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Mobile broadband update

The International Telecommunication Union estimates that the number of global mobile phone users will reach 4 billion by the end of this year, while a report from research firm Analysys suggests that a quarter of fixed-line broadband users in the UK will have switched to mobile alternatives by 2013. Analysys estimates that aggregate internet bandwidth demand will remain level, but that mobile carriers will need to upgrade their networks to cope as users switch over.

In the UK, people on the move have shown that they now prefer to use mobile broadband rather than Wi-Fi access points. A survey for Point Topic reveals that 47 per cent of mobile users access the internet via mobile phone, compared to 42 per cent who prefer Wi-Fi hotspots when away from home or work. Mobile access has become almost ubiquitous, although Wi-Fi may be cheaper and faster where available.

The GSM Association (GSMA), a mobile industry grouping representing a wide range of major manufacturers and mobile operators, has launched a global 'Mobile Broadband service mark' indicating devices that have installed broadband capability 'that will be ready to switch on and surf straight out of the box'. Unlike the Wi-Fi

labelling scheme, laptops and netbooks carrying the mark do not have to undergo a certification process to prove their conformance to uniform standards, so equipment may work with HSPA (High Speed Packet Access), HSPA Evolved or LTE-enabled data networks. (See previous article for a brief description of LTE.) The group hopes that a wide range of devices will eventually carry the mark, from cameras and MP3 players through set-top boxes to cars. Devices displaying the mark must be 'untethered' - not locked to a particular network.

T-Mobile and 3 have launched new wireless routers for their mobile USB modems. A modem is placed in the small docking station, which can share bandwidth for up to four users connecting wirelessly to the device.

The Mobile Broadband 1000 service from FREEDOM4 combines software and a USB dongle to select the best signal from mobile 3G data and Wi-Fi connections (where both are available). FREEDOM4 has over 4,000 Wi-Fi hotspots in the UK. Access can be purchased on a pay-as-you-go basis, or as a £25 per month bundle of 1,000 'units'. (Units are Wi-Fi minutes or megabytes of data transferred over 3G).

Google has submitted a US patent that embodies a vision of free mobile roaming - users' phones and mobile devices would automatically compare the pricing of available networks in a 'mini-auction' and choose the best available, taking account of speed and signal strength. This challenges existing policies of hardware lock-in and would reduce mobile operators to 'bit pipes' - companies that simply provided wireless data access, potentially swamping operator's networks with demand to high bandwidth services like mobile video.

Google's Engineering Director, Andy Rubin, has outlined his vision of how mobile phones could become part of a global information network: GPS sensors can relay traffic flow and weather information back to mapping services; photos and position information can bring locally-tailored information to you according to your expressed or observed preferences; farmers in less developed countries can receive irrigation advice; smart alerts update you on progress of auctions and stock prices; and you can be shown visitor information based on opinions of others who have travelled in the same area.

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Satellite and mobile

Qualcomm is to integrate satellite technology from SkyTerra Communications' Mobile Satellite Ventures and ICO Global Communications into selected mobile chip designs, enabling many more people to access satellite mobile communications from 2010. Services in North America will include voice, data and television channels. In addition to expanding the market for satellite-enabled devices and creating hybrid services, the addition of satellite technology to existing mobile systems will improve coverage in poorly served areas.

O3b networks is planning to provide wireless broadband internet access to emerging markets using a mix of 3G, WiMAX and satellite technologies. Although subscribers will connect to a standard base station, much of the backhaul to the wider internet will be provided through 'fibre quality' satellite links operating at up to 10Gbps. Existing geostationary satellites introduce high latency (delay) into communications due to their distance from earth. O3b has started a launch programme for a network of 16 medium orbit satellites, operating at a third of the height of geostationary systems, to reduce that latency to more acceptable levels.

O3b's mission is to work with commercial partners to reach the 'other 3 billion' that may be missed in mobile deployments that are currently planned. Google, HSBC and Liberty Global have invested in the project, although further funding is required to meet the costs of a full service, planned to begin operations in 2010.

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Broadband update

Ofcom launched its proposals for 'super-fast broadband' over fibre in September. Promising speeds of up to 100Mbps, Ofcom is consulting on the appropriate regulatory framework within which suppliers would operate. Ofcom intends producing a framework that balances the risks of innovation against consumer interests through effective competition.

BT has introduced scalable business Ethernet connection to its 21CN (21st Century Network) infrastructure. The Etherflow service is purchased per month and can be varied according to business requirements - companies choose from standard or premium traffic classes and adjust settings using an online 'self-service' portal. 21CN has 106 core and access nodes that already 'cover all the major business centres

across the UK', but this is planned to increase to over 1000 by the end of 2009. 21CN is a consolidation and development of 17 different network platforms into an 'end-to-end' IP (Internet Protocol) digital network. Etherflow speeds between 10Mbps and 1Gbps will be available initially.

Muswell Hill in London and Whitchurch in South Glamorgan will be the first two areas where BT Openreach will roll out 'fibre to the cabinet'. Up to 15,000 customers in these areas will have access by summer 2009 to broadband speeds that could (potentially) reach 40Mbps. If the scheme is a success, exchanges covering 10 million homes will be upgraded by 2012 at a cost of £1.5 billion. BT is also trialling 'fibre to the premises', which is significantly more expensive but provides speeds of up to 100Mbps, in Ebbsfleet Valley, Kent.

BT has also launched the I-Plate to improve existing broadband speeds delivered by ADSL+ technology over normal copper landlines. The master phone socket in most homes has a redundant 'bell wire' that was used to activate the phone's ringer. Telephone extension wiring takes this bell wire around the home, where it can pick up interference from all kinds of electrical equipment, which can then affect quality of broadband transmissions. The I-Plate is a small 'self-install' product costing around £10, but may be offered free by some ISPs. BT estimate that seven out of ten homes could benefit, with 'typical' speed improvements of 1.5Mbps.

Researchers from the Oxford Said Business School and the University of Oviedo's Department of Applied Economics have developed a 'Broadband Quality Score' to rank countries according to download and upload speeds, error rates and latency (delays). Of the 42 nations surveyed in the Cisco-funded research, the UK, Italy and Spain did not achieve the threshold for providing a consistently reliable connection for current applications, while only Japan was judged to have high enough quality connections for 'next-generation' internet services involving high levels of interaction and significant video content.

The European Commission has begun a debate on achieving 'Broadband for All'. Although 36 per cent of households already have broadband connections, 37 per cent in rural areas have no opportunity to connect to broadband at all. These EU figures hide national disparities, with every Danish household covered, but only 88 per cent of German rural households and 40 per cent of all households in Romania. The EU is considering implementing a new universal service obligation on top of existing regulation covering telecommunications services, access to satellites and use of radio spectrum for broadband.

NYnet has been selected as part of a European funded B3 (Regions for Better BroadBand) initiative. The 26-month, 3.5 million euro project aims to combat the social and economic disadvantages experienced in rural areas through providing fast broadband to businesses and homes. NYnet is a public sector organisation resulting from collaboration between Yorkshire Forward and North Yorkshire County Council.

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https://www.nynet.co.uk/news.php?id=76

JANET Lightpath network

The Joint Academic Network, JANET, created by JISC on behalf of a wide range of UK academic institutions, has added Lightpath to its infrastructure. This new fibre optic network can serve data at peak speeds of 10Gbps, using protocols that maintain the order of packets sent. The normal packet switched network, on which 'standard broadband' is based, would take up to 30 years at 0.5Mbps to transfer the 60 terabytes of data recently sent by the Rutherford Appleton Laboratory to CERN over a ten day period. (One terabyte is approximately a million megabytes.) JANET Lightpath was launched a year ago to serve higher education and research institutions.

Bagpipes via 'Lightpath' leave broadband in the shade
http://www.jisc.ac.uk/Home/news/stories/2008/09/bagpipes.aspx
JANET lights the way for UK research communities
http://www.ja.net/company/news-2007/lightpath-launch.html

Wi-Fi innovations

The IEEE's Very High Throughput (VHT) Study Group is looking at forming a new working committee to standardise technical solutions for Wi-Fi operating at 1Gbps or more. For short range (perhaps 10-20m) purposes, 60GHz ('millimetre wave') frequencies can be used, although these are readily absorbed by walls and other obstructions, while longer distances would use frequencies below 6GHz. Individual devices may have a maximum throughput of 500Mbps, which would aggregate at an access point (depending on bandwidth sharing) to 1Gbps or more. Gigabit wireless Ethernet technology already exists for point-to-point connections, which link two devices directly, but standards are required that include emerging security and mesh networking protocols, backwards compatibility to slower 802.11 standards and the physical controls required for such high speeds. Some in the group expect to see devices around 2011, but other proposals do not expect the standard itself to emerge before 2012 or 2013.

Recent In-Stat research suggests that nearly a billion devices using embedded Wi-Fi will be shipped annually by the end of 2012, with 294 million devices sold in 2007 alone. This annual growth rate in shipments of 26 per cent will be fuelled by increasing use of Wi-Fi in mobile handsets rather than laptops, as sales of the former overtake laptops with Wi-Fi in 2011. Due to sheer numbers sold overall, In-Stat expects shipments of Wi-Fi enabled televisions to increase significantly, although other technologies like Bluetooth and emerging wireless HD standards could be used to wirelessly connect televisions to the internet.

The University of Sao Paulo has devised a solar-powered Wi-Fi access point that can be mounted on lampposts and attached to other suitable locations. Both electrical and telephone connections can be unreliable in developing countries, so this self-contained unit can store solar energy and will form a mesh network with peers to connect back to any point that has an actual internet connection. The motorcycle batteries currently used will store sufficient power for two days, but the project aims to achieve ten days' stored power for coverage during the rainy season.

Broadcom is combining Wi-Fi with standard GPS location systems to improve coverage in urban areas and within buildings. Using technology from Skyhook Wireless, it will integrate both systems with software that will compare the user's location to a database of known Wi-Fi access points when GPS signals are inadequate. Mobile devices containing the Broadcom chipsets will be able to access location based services under a much wider range of conditions.

A team from Battelle, a US research company, has achieved a 20Mbps point-to-point connection in the labs for a carrier in the millimetre wave band (60-100GHz) and demonstrated a system running at 10Mbps over a distance of 800m. Encoding data onto a high frequency signal at such high bit rates is extremely difficult, but the group used paired lasers, operating at lower frequencies, which could be used to encode data for a 100GHz signal by exploiting the interference patterns they produce. Technical issues remain relating to the actual size of the equipment and controlling the signal, making possible commercialisation some way off. If such technology becomes viable, it could be used to transmit uncompressed HD television signals or for high capacity data links within local areas.

IEEE gets to work on gigabit Wi-Fi
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Lighting networking

Boston University and partners are creating a network system for offices and houses based on visible light rather than wireless signals. Just as many portable products, such as torches, are swapping from incandescent bulbs to power-efficient light emitting diodes (LEDs), the researchers believe that household lighting will move away from the current generation of energy-saving 'compact' fluorescent bulbs to LED technology over the next 15 years.

LEDs produce extremely fast pulses of light - so fast that the flicker is imperceptible to the human eye. Using very slight variations in the frequency of these pulses, or other modulation schemes, the researchers hope to encode data at rates of one to ten megabits per second. The 'Smart Lighting' system would negate the usual problems of radio frequency interference on Wi-Fi networks, as light will not travel through walls and other opaque objects, although a device could not work in the user's pocket since a line of sight would be required. The press release is not clear whether a portable device would use light as the 'uplink' channel or more regular wireless protocols. The researchers also see applications in 'broadcast' style applications (for example in-flight movies) and possible uses in traffic safety systems as more cars use LED brake lights.

Illuminate & communicate
http://smartlighting.bu.edu/news/articles/SmartLighting_BU_release.pdf
Smart Lighting http://smartlighting.bu.edu

WPA wireless encryption weakness discovered

Many wireless networks are secured against eavesdropping using Wi-Fi protected access (WPA) encryption. WPA is a much improved security standard that should always be used in preference to the older, significantly weaker, wired equivalent privacy (WEP) protocol.

Researchers Martin Beck and Erik Tews have reported a flaw in the backward-compatibility elements of the WPA standard. The protocol makes extensive use of checksums to identify errors in transmitted data, based on techniques first deployed in WEP. (Checksums are mathematical algorithms that produce a short string of numbers related to the content of a packet of data.) The crack requires small packets of data with a widely known structure, such as those used to resolve network addresses into the actual hardware addresses of devices on the network. By exploiting the older WEP elements embedded in WPA, the researchers were able to find and spoof the hardware address of an access point in only 12 to 15 minutes. The crack is only partial, as the keys are not revealed and data travelling in the reverse direction cannot be tampered with at all. Further, various characteristics of particular network configurations may render the attack less effective.

WPA permits two encryption sub-protocols: TKIP and AES. This hack only applies to the former, so (based on information currently available) networks that employ WPA with the AES protocol, or the more recent WPA2 standard, should be most secure.

Where used, non-dictionary-based passphrases, with at least 20 characters, are considered more secure.

Researchers crack WPA wireless security
http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=106606
Battered, but not broken: understanding the WPA crack
http://arstechnica.com/articles/paedia/wpa-cracked.ars

VOIP to provide access to 999

Voice over IP (VOIP) services, such as BT, Skype and Vonage, can be used as an alternative to a landline to contact other telephones. However, despite many consumers believing that these provide access to the emergency numbers (999 and the pan-European 112 service), this cannot be assumed. Where households have dropped landline connection entirely - in favour of cable broadband - this could leave a consumer trying to dial 999 on VOIP in emergency and being unable to connect. Ofcom, which now requires access to be provided and (where possible) caller location information, has said that it will use enforcement measures on VOIP providers as a 'last resort'.

Vonage claims that its service always has been compatible, but it is reported that Skype has said that it will not comply.

Ofcom forces internet telephony services to cover 999 calls
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VoIP order to allow 999 calls and give caller location
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Skype refuses to comply with 999 ruling
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Multimedia

Analysis: 3D displays

At a glance

- Adding the third dimension to displayed images can aid understanding and improve appreciation of virtual objects and environments.
- Producing a 'true' perception of depth requires a stereoscopic display system that creates unique images for each eye.
- Many systems require additional hardware for each viewer, such as polarised glasses or shutter glasses. 'Autosteroscopic' displays do not require glasses but viewing angles or positions may be limited in some systems.

- There are few agreed standards governing creation, transmission or display of 3D imagery. Many systems are proprietary.
- 3D content creation requires specialist recording hardware or powerful 3D software (such as CAD systems and games). Prepared 3D content is limited, especially outside the entertainment industry. Systems to convert 2D content to 3D are beginning to be used.

Introduction
Images on screens are two dimensional, although clever use of perspective, shadows and others artefacts can give the sense of a third dimension in 'first person shooter' games and other three dimensional (3D) applications. To create a 'true' third dimension, it is necessary to account for the way that a pair of human eyes produces slightly differing views on any scene.

3D applications
In addition to games and other entertainment systems, there is a wide range of professional applications that could use 3D displays: many design projects benefit from visualising objects in 3D; mapping and landscape analysis are enhanced with 3D; microsurgery can be much more effective when the surgeon can control devices using a 3D view; new systems are emerging (as seen in the Data Forest project at Reading University) for visualising data in three dimensions; military personnel can experience more realistic virtual combat exercises; and scientists can model molecular structures in 3D.

Many existing applications use simulated 3D, so that the viewer can zoom in or pan around an object as though it were in three dimensions but, without some form of stereoscopic 3D display, the user cannot get a true impression of depth and the relative position of objects. Systems from NTT, Immersion Corporation and others use special gloves with embedded haptics devices, which produce vibration or other tactile feedback, to add the impression of touching a displayed object.

One example of use in education is GCSE students near Hull using the university's Hull Immersive Visualization Environment (HIVE) to see the outcomes of their engineering projects in 3D and carry out more realistic evaluations of their designs with an engineer from BAE Systems, who was acting as their 'client'. Designs were created in a CAD system and exported as Virtual Reality Markup Language (VRML), suited for import into HIVE. Year 6 pupils from local primary schools also explored the results of slicing virtual 3D solid shapes.

3D principles
The eyes of an adult are spaced about 2.5 inches (6.2 cm) apart, giving each a slightly different view on the world. The brain largely uses 'parallax', the differing angles of light travelling to each eye and relative movement of objects, to determine the positions of the parts of a scene. Other cues include focal length, depth of field, shadows and judgements about perspective based on knowledge of the relative sizes of common objects. Stereoscopic displays provide slightly different views of a scene to each eye, which the brain then merges into a single 3D image. Vendors of

3D systems include Kodak, Hitachi, NEC, Philips, Samsung, Sanyo, Sharp and Toshiba, among others.

Johnny Chung Lee, a researcher at Carnegie Mellon University, has produced software that tracks head movement so that the display can be updated in order to give a truer sense of the relative positions of objects. This system can only work for a single user as the projected image depends entirely on the position of the viewer.

Creating a 3D image which can be viewed by many people, as opposed to single-user head-mounted displays, requires some form of 'dual' display that gives each eye its own view. There are five main approaches.

Anaglyphic images
Some of the earliest systems involved wearing red/blue 'anaglyphic' glasses. The projected image simultaneously displays the correct view for each eye, one in a red tone and the other using blue or cyan. The red lens in front of (say) the left eye prevents it seeing the image intended for the right eye by filtering out the blue objects. The brain automatically seeks to realign the red and blue images observed by each eye, creating the impression of a 3D scene. Due to the limitations of colour filters, the resultant image does not fully reproduce subtle tones.

Paper glasses with simple plastic filters are very cheap to produce, although the dominance of cyan light in controlling the eyes' ability to focus makes more expensive, optically-corrected colour lenses preferable for viewing objects at short range.

Shutter glasses
The next approach displays alternating frames, intended for the left and right eyes respectively. In order to get the 3D effect, viewers must wear 'shutter glasses' synchronised to the display - each eye is alternately 'covered' under the control of a signal from the display system.

The shutters in modern glasses comprise a liquid crystal (LCD) layer rapidly flipped open using embedded microelectronics, making the cost significantly higher per viewer than using anaglyphic filters, although colours are far more accurate. (Shutter glasses cost $40-60, or more, depending on whether the control system is wireless.) Since the frame for each eye is not displayed simultaneously, this system creates greater strain on the brain as it tries to merge the images, while LCD shutters will reduce the brightness of the display.

Recent displays designed for use with shutter glasses have refresh rates of 120Hz, meaning that they can alternate the display to give a full 3D image once every sixtieth of a second. This (effective) 60Hz refresh rate, which manufacturers claim is easier on the eyes than previous systems, is accepted as the minimum for most conventional displays.

Hardware for use with shutter glasses is basically the same as 2D displays - all that is required is a means to synchronise the shutters, which may be controlled by the

hardware (especially in televisions) or through software and the graphics card in a PC. Samsung and Mitsubishi already distribute HD displays, which they claim are '3D ready', while Viewsonic has demonstrated a prototype 120Hz display and Panasonic launched a 3D home 'theatre' system in September 2008. Projectors are also available from companies such as Barco, InFocus (DepthQ) and Christie. 3D projectors tend to be quite expensive, but televisions at the higher end of manufacturers' ranges already have 3D capability.

Polarised glasses
Developers have also produced polarised displays: the wave patterns of light reflected from objects are normally disorganised, but polarisation causes the light waves to line up in a given plane. Manufacturers, like iZ3D, take advantage of the fact that LCD screens polarise the light that passes through them. Two liquid crystal layers are used: the first controls the brightness of each pixel in the normal manner, while the second layer 'steers' the polarised light into a plane that is either 45 or 135 degrees from the horizontal.

Users wear glasses with lenses polarised to match, so that light polarised at 45 degrees passes to the left eye and that at 135 degrees is seen by the right eye. Images are viewed simultaneously by both eyes, although the extensive use of polarisation reduces the brightness of the image. iZ3D's 22 inch monitor is $599 (£400). Although not as cheap as anaglyphic glasses, polarised lenses are much cheaper ($10) than LCD shutter glasses.

Projector systems for polarised 3D viewing are much more expensive, as they need to have some form of dual beam - generally created using two projectors - which must be synchronised and aligned. If not built in, or provided through software, a 'demultiplexor' is also required to split the video channels for the left and right eye. This makes polarised 3D projection expensive and, without special 'aluminised' screen to reduce scattering and depolarisation of the light, difficult to set up effectively.

Parallax barriers
A parallax barrier creates angled 'slots' that display a slightly different image to each eye; by alternating these across a display, using LCD technology to create the slots and producing an appropriate image for the pixels behind each slot, a 3D view is created. This system only works where the user is in a well-defined area, so is suited to small, single-user displays. Sharp has produce 2D/3D switchable screens for NTT DoCoMo mobile phones based on this technology.

Lenticular overlays
The final system uses small lenses in a 'lenticular' overlay across a standard display. These lenses are aligned with the pixels of the display, such that alternate pixels (or clusters) can be used for the image seen by each eye. The lens system restricts the field of view over which 3D images can be observed. This type of system, known as 'auto-stereoscopic' because the user does not need special glasses, is used in displays and overlays produced by NEC, Spatial View and others.

Other approaches

HoloVizio displays from Holografika project light from optical modules in various directions through a 'holographic screen', creating a 3D image that multiple users can view simultaneously from their own perspective. The image is rendered in such a way that background objects are not 'occluded' (covered) by those in the foreground of the display. Generating moving 3D information for such a system to display in real time would take significant processing power. Demonstration images are currently limited to still or very simple moving objects.

Volumetric displays

One of the greatest challenges is to create a 3D 'hologram' in open space. Such objects are not true holograms but, technically, volumetric displays. To achieve a 3D rendition there has to be a display medium, such as a spinning mirror or multiple FogScreens. (FogScreens produce a thin curtain of fine water droplets.) Volumetric displays create considerable challenges due to processing and bandwidth requirements, especially when accounting for the occlusion of different parts of an image from multiple viewpoints.

Creating 3D images

Many CAD programs and games already pass 3D information to the graphics card on a PC. To produce a stereoscopic image the graphics card calculates a second viewpoint, which it outputs as alternate frames or interleaved in the pixel pattern, or scan lines, for the display. Shutter glasses require a control signal to be generated and an appropriate output port to be available in the hardware. Both ATI and NVIDIA provide 3D facilities in many of their more recent graphic cards and drivers, although it is essential to check compatibility with the particular application and display device to be used.

New digital 3D imagery can be generated using a video camera with synchronised, paired sensor arrays. Systems, such as In-Three's IN3D, also allow 2D video to be converted into 3D content. Links to manufacturers of all kinds of 3D products can be found from stereo3d.com.

Barriers to implementing 3D

The move away from anaglyphic displays and introduction of devices that use higher frame rates has helped relieve the discomfort some viewers experience with 3D systems, although the health and safety implications of prolonged use of more recent systems remains unclear. 3D displays are more expensive than 2D systems and some have additional costs due to the need for glasses for each user; some are also limited in the number of simultaneous users and the available viewing angles. Creation, transmission and display of 3D information add to bandwidth and processing overheads.

Many aspects of 3D depend on proprietary systems for capture, synchronisation, transmission and display of 3D images, although films recorded in an alternate frame format are now quite commonly available. The Society of Motion Picture and Television Engineers (SMPTE) established a '3D Home Entertainment Task Force' in

July 2008 to identify and seek to resolve many of these issues across a range of broadcast, streamed and recorded media.

Despite these issues, as the technology has improved and costs reduced, industry is trying once more to interest the public in 3D entertainment - a number of films are being released (or re-released) in 3D and broadcasters have trialled 3D television.

Conclusion

Considerable advances in hardware have brought relatively inexpensive 3D systems within reach of homeowners and education. CAD, games software, recorded 3D media, virtual reality environments, immersive applications, digital 3D images and film could all potentially benefit from 3D displays. However, outside the home entertainment industry, there is limited 'off-the-shelf' content available.

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Multimedia news

Graphics processor update

Graphics processor units (GPUs) draw additional power from a notebook computer's battery and are often used to do little more than display an almost static screen. However, computers that have basic graphics built in to the chipset struggle when it comes to delivering real time imagery, such as may be needed for CAD applications or some educational games. NVIDIA has solved the problem by creating a system where users can seamlessly switch between the graphics card and the Intel graphics integrated into the chipset, without rebooting, depending whether graphics capability or power-saving are the key requirements at a given time. Certain notebooks, which contain NVIDIA's GeForce 9M Series GPUs, from BenQ, Fujitsu Siemens and Sony, are designed to use the technology.

Leadtek and Thompson have announced add-in graphics cards designed around the Cell processor used in Sony's PS3 games console. Toshiba already supplies graphics processors based on its four-core SpursEngine in some of its Qosmio notebooks. In common with GPUs from ATI and NVIDIA, the new cards, expected to cost £160 to £260, can relieve demand on the main processor by separately encoding and decoding HD video in hardware. This may allow manufacturers to design HD-capable PCs with cheaper main processors.

NVIDIA pioneers new hybrid graphics in notebooks
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Video cards running PS3's Cell chip coming soon
http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=105070

HDTV update

General standards for high definition television (HDTV) pictures are now well established, but less has been done about sound - broadcast and recorded content may be set at different levels, so switching media, or even watching advertisements, may produce a sudden change in volume. Several developers are looking to control volume levels according to the user's preference or extract different types of sound

from the audio stream. The latter may be useful for content played back in a classroom or lecture hall, where the background noise obscures key dialogue or narration. Devices have been demonstrated, but televisions and DVD players containing these technologies have yet to come to market.

The range of colours produced by different display technologies is known as the gamut of the device. These colours map out as a colour space ranged between the three primary colours, red green and blue. No device has a gamut that matches that of the human eye, so what you see on a well-adjusted screen may not be what was in the original image - a problem further compounded when an image is printed on a device with its own, separate gamut. The backlight for many LCD screens is based on cold cathode (CCFL) technology that produces a strong white light. Clusters of coloured (RGB) backlights matched to the pixels of the screen could create a gamut that better matches that of the human eye.

The IEC, a standards body for a range of electronics products, released a standard (IEC61966-2-4, also known as xvYCC) in January 2006 to describe an improved colour space for displays. Sony recently proposed that the industry uses an 'x.v.Color' branding for displays designed around this colour space. Digital displays based on this standard will produce deeper primary colours.

Panasonic claims to be the first company to have produced an end-to-end 3D system based on Blu-ray Discs and a large plasma HDTV display. The system has the highest resolution 1080p HD images encoded onto a single, standard disk, which the hardware can decode and display in real time. The actual 3D effect is created using alternating frames and special shutter glasses that ensure that each eye receives the correct image in turn. (See the 3D displays article above for details of these systems.) Panasonic state that they will be working with the Blu-ray Disc Association to standardise around this format for 3D content.

The BBC has demonstrated both transmission and demodulation hardware based on a new broadcast digital television standard known as DVB-T2, which was first approved in June this year. This standard controls broadcast of digital HDTV signals, which are planned to be broadcast through the Freeview system towards the end of 2009. It is possible that new 'datacasting' services will be made available through spectrum-usage efficiencies introduced in the DVB-T2 standard and the 'switch off' of analogue broadcasts in 2012.

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Displays update

Mary Lou Jepsen has helped form a new displays company, Pixel Qi, to exploit technology she first developed while working with the OLPC project. She found that display manufacture could be more closely aligned with production methods used by chip designers to lower costs. The display designs integrate a reflector behind the backlight so that ambient light can also be used to create the image rather than using energy to power an LED backlight. Sensors control the backlight to optimise the display under different lighting conditions and the display drivers ensure that screen refreshes are only carried out as required. Jepsen claims that these techniques can save up to 99 per cent on power consumption. She says that Pixel Qi displays will first appear in low-power laptops.

Philips has demonstrated a display that is a mere 8mm thick, due to reducing the width of the backlight. Designed for 32-inch televisions, which can be hung on walls like a 'piece of art', the hardware weighs only 5kg - a third of that for many comparable products. The light guide has been cut from 25mm to just 1mm by optimising the pattern of light produced by LEDs at the top and bottom of the display and fine tuning this to the structure of the light guide plate. Other manufacturers are working on ultra-thin LCD displays - Sony is reported to be launching a 9.9mm display in Japan.

Using organic light emitting diode (OLED) technology, Sony has produced a prototype display that is less than 1mm thick. OLED displays produce light when a voltage is applied across layers containing organic polymers. Unlike LCD devices, which need a backlight and an LCD layer to selectively block the transmission of light, OLEDs emit light, producing brighter, thinner displays.

A Taiwanese company, Chi Mei, has also demonstrated a 1mm thick OLED panel but, at 25 inches, theirs is more than twice the diagonal size of Sony's. The prototype screen has a native WXGA (1,366 pixels by 768 pixels) resolution.

Samsung's latest pre-production OLED display measures 40 inches across the diagonal, but is 8.9mm thick. It displays full HD resolution images (1920 by 1080 pixels).

Researchers at Max Planck Institute for Polymer Research in Germany and engineers from Sony have created a new type of flexible OLED display. In existing e-paper and flexible OLED technologies, the electronics are integrated into the 'screen' of the display, reducing the brightness of the image and adding to the weight. The new system uses a transparent organic polymer layer, which will fluoresce when exposed to infrared light, sandwiched between two flexible plastic sheets. A demonstration system used an infrared laser to scan across the display to create a

fast-moving cartoon image. Combinations of chemicals 'upconvert' infrared light into different parts of the visible spectrum, enabling the team to produce the normal primary colours required for a display. However, further work is required to create the multilayer, pixelated versions of the technology required for a full colour image. The system would be cheap to produce using common manufacturing processes, but the requirement for a scanning laser would make it quite bulky. Potential uses include display advertising, public information services, heads-up displays and other projected images. The underlying research is published in the New Journal of Physics.

Plasma displays use a mixture of inert gases (typically xenon and neon) trapped in a grid of cells between two glass sheets. These gases are energised using electrodes until they form a plasma, which produces ultraviolet light that excites coloured phosphors to produce visible light. Plasma screens have faster response times, better contrast ratios and are lighter weight than LCD-based screens, making them more suited to large (40-inch and above) displays, but advances in LCD technology have put the two on a more equal footing. Shinoda Plasma, a Japanese company spun off from Fujitsu, has created a flexible, 1mm thick, 3m by 1m plasma display using very fine glass tubes rather than plates. The resolution is only 960 by 360 pixels, so it is currently suited to public information systems rather than television. Commercial versions are expected by the middle of next year.

Qualcomm has announced its first interferometric modulation (IMOD) display to be available in a commercial product, the limited edition Freestyle Audio FA300 waterproof MP3 player. IMOD devices produce colour through creating interference patterns in reflected light, using the same principles that create colour on a butterfly's wing. A reflective membrane and a 'thin-film' stack (which is partially reflective and partially transmissive) are separated by an air gap; electrostatic attraction is used to close the gap, turning the display element off. Light reflected from the thin film and from the underlying reflective membrane will be slightly out of phase, so the size of the gap controls the colour produced as different wavelengths interfere, either constructively or destructively. This enables the designers to create colour subpixels using an array of elements with differing air gaps. Since it is based on reflected light (unlike LCDs that need a backlight and tend to absorb the light produced), IMOD technology produces bright displays with low power consumption, even in full sunlight.

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Touch screens

Researchers from Durham University's Technology-Enhanced Learning Research Group are designing a 'SynergyNet' interactive desk system. Using infrared tracking, each desk features a multi-touch display surface at which several students can work simultaneously. Desks can be networked to the main interactive whiteboard at the front of the class, creating a fully interactive classroom. The team envisages collaborative applications, giving greater equality of access to all students. Software designed for the system will be made publicly available under open source terms.

SMART Technologies has also developed a multi-touch table designed for primary schools. The SMART Table, which measures 73cm by 65cm and accepts input from multiple users, is expected to launch in the US next spring for around $8,000 (£5,333). It will feature a range of interactive applications and teachers will be able to import other activities, constructed using the SMART Notebook software and SMART Table toolkit, using a USB memory stick.

NOR_/D, also known as Nortd, has released two open source, multi-touch projects. The First is CUBIT, an interactive surface designed 'with the intention to redefine visual computing and depart from the mouse pointer paradigm'. The second - software for the touch interface - is based on the TouchKit API, a set of open source programming protocols linked to a hardware reference design.

Microsoft has released the Touchless software development kit (SDK) for multi-touch applications using a standard webcam. Users identify brightly coloured objects as 'markers' and move these within the camera's field of view to control an application. Four sample games are provided. As an Office Labs community project, it was developed in employee spare time and the code is also available on an open source basis.

Microsoft has combined a range of technologies to create a multi-touch screen with hand-tracking and 'magic lens' capability. The SecondLight system can display one image on the platter and another on a piece of tracing paper held above the surface, enabling 'x-ray vision'. The hardware comprises dual projectors, dual cameras, a switchable screen and infrared illumination. The magic lens effect is created using the switchable screen embedded in the surface, which is controlled by liquid crystal technology that has a clear and a diffuse state. These switch rapidly, so that one image is displayed on the surface while in the diffuse state and another is projected

onto any object held over the platter when in the clear state. The projected image is also switched simultaneously by shuttering the two projectors in time with the screen.

Infrared light is used for object and gesture tracking, as this simplifies image processing - light reflected from objects in the visible spectrum is filtered out to give a well-defined image that can then be processed and used to control the display. Fingers touching the display can be accurately tracked, but the clear state of the screen allows the cameras to continue tracking objects in the area above the screen. Although the latter is not as accurate, it is possible for the 'x-ray' image to be 'zoomed' as the translucent sheet used for viewing is moved nearer the surface and multi-touch effects can be created from objects moving in free space. Some of the setups used for demonstration employ infrared LEDs and reflective markers to improve tracking.

Microsoft acknowledges that it has no specific applications in view at this stage. A whitepaper gives details of the operation and technologies embedded in SecondLight.

MultiTouch has launched modular LCD touch screen units that can be combined to make large interactive table-top or wall displays. Each panel, which can be positioned in a landscape or portrait mode, is either a 32-inch or 46-inch HD-ready LCD display. MultiTouch states that cells include 'a high-performance system for tracking any number of hands'.

Smart desks make sci-fi a reality in the classroom
http://www.dur.ac.uk/news/newsitem/?itemno=6969
SMART introduces first interactive table for primary students
http://www2.smarttech.com/NR/rdonlyres/213AA682-287D-40DB-A568-DE472E4AB5CC/0/SMARTTablerelease.pdf
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SecondLight: Surface on steroids http://www.pcpro.co.uk/news/233511/secondlight-surface-on-steroids.html
Going beyond the display
http://www.microsoft.com/presspass/download/features/2008/Secondlight_CR3.pdf
MultiTouch launches the first modular multi-touch LCD screen
http://s3.amazonaws.com/multitouch/assets/media/press/press-release-080901-en.pdf

One television, two views

High definition televisions from Samsung and Mitsubishi using TI (Texas Instruments) DLP technology will be able to show two 'simultaneous' views. DLP (digital light processing) technology uses micro-mirrors mounted on a silicon chip to control the information displayed by individual pixels in projection systems. TI's

DualView system uses shutter glasses in exactly the same way as described for 3D viewing in the analysis piece above. However, instead of alternating views for each eye, two viewers both wear glasses and the system switches views between the users instead. This enables gamers, or other users, to have completely different perspectives on the same scene using a single main display.

The TI hardware demonstrated in July drove the display at 120Mhz, creating a 60 frames per second display to each user (or to a single viewer using 3D). TI now has plans for a 240Mhz system that will give dual, 60fps 3D views, or individual views to 4 users.

Although DLP projection systems have advantages for large screen sizes (above 60 inches), there is no conceptual reason why other systems designed for 3D (except anaglyphic glasses) should not be driven in the same way.

DLP product's DualView, the ultimate duelling technology for gamers
http://www.dlp.com/regional/uk/technology/press_releases_details.aspx?id=1339
DLP's Future: DualView Games, Quad-View Tech
http://www.extremetech.com/article2/0,2845,2334138,00.asp

Image recognition

The latest version of the Picasa photo editing, web storage and sharing service now boasts a face recognition system. Users first tag people by name in a few photos and the system will then seek to tag all other photos containing the same face. This could help users with many photos identify those containing the same individual.

Toshiba demonstrated an experimental television system at the IFA exhibition in September that could recognise a raised hand and track its movements to control the hardware. The raised hand signals a desire to take control and can then be used to adjust the volume or move a cursor. A related system uses cue cards to control the display. In addition to reducing the need for a remote, this system could prove helpful to users with limited control over their hand movements. The interface was designed by a team, led by Professor Roberto Cipolla, which is seeking to improve response under different lighting conditions and when multiple potential users are present.

Name tags in Picasa Web Albums http://picasa.google.com/features-nametags.html
A new Picasa puts a name to all those faces
http://solution.allthingsd.com/20080909/a-new-picasa-puts-a-name-to-all-those-faces
Control your TV simply by waving your arm
http://www.physorg.com/news141570427.html
Professor Roberto Cipolla Research Topics
http://mi.eng.cam.ac.uk/~cipolla/research.htm

Photo search

Automating search for images is extremely difficult, unless surrounding text (or associated metadata) describes the content, or they are tagged directly by humans

using appropriate keywords. Imprezzeo - a start-up company formed to commercialise technology from two Australian universities - will soon launch a system to refine image searches based on similarity to pictures selected by the user: an initial image search is carried out using a regular search engine; users then select a sample of photos that more closely represent the desired image and Imprezzeo will reorder the other results according to similarity using facial recognition and other visual cues.

Two researchers from Penn State University have manually tagged 60,000 images according to their visual content. These were then used as a source for a statistical model from which a computer can match other photos based on patterns in colour and texture. The idea is to build an image search system that uses the content of photographs, either by comparing to an example image or using keywords.

Due to the difficulty of recognising the subject of an image, search engines primarily index photographs using labels assigned by the website designer or on the content of surrounding text. Although humans can readily extract information from visual sources, computers struggle to achieve the same. Lead researcher Jia Li does not believe the system will ever be 100 per cent accurate, as there is too much distracting information in most photographs. Further, different people will choose different primary tags for a particular image and the model she has built would find it hard to distinguish between related images, such as a child and an adult.

Research transforms image search market
http://www.physorg.com/news140190436.html
Imprezzeo http://www.imprezzeo.com
Researchers teach computers to search for photos based on their contents
http://www.physorg.com/news142698659.html
ALIPR http://www.alipr.com

Photo metadata

A Metadata Working Group, supported by companies including Adobe, Apple, Canon, Microsoft, Nokia and Sony, is developing a description of how information about photographs is stored and transferred between different digital systems and formats. Many cameras automatically record details about the date a photo is taken and the hardware used, while users may add tags relating to the location and content of the image. The specification is designed to improve interoperability between existing formats and software standards, to ensure greater preservation of metadata when images are moved between systems and applications. Further development of the specification will enlarge the range of metadata covered and may encompass moving image formats.

Metadata Working Group introduces first specification...
http://www.metadataworkinggroup.com/press/pdf/photokina_pr_2008_09_24.pdf
Metadata Working Group http://www.metadataworkinggroup.org

Haptics

Haptics gives users the impression of touch through kinaesthetic responses, vibration and other tactile cues. Purdue University is using haptics-based systems to help students understand the quantum effects that occur with nano-scale objects. At this level, common-sense assumptions based on Newtonian physics do not work, so actually 'feeling' what is happening has been shown to help improve retention of the underlying principles. The hardware can now cost as little as $200 (£133).

Researchers at the University of Tokyo have demonstrated an 'airborne' tactile display based on the static pressure fields created when an object is placed in the path of ultrasound 'beams'. Hands or other real objects are tracked using a camera and synchronised to a displayed 3D object; feedback is created when the virtual object is 'touched' by controlling an array of ultrasound transducers to produce focused interference patterns. The hardware is currently a research prototype, but the developers envisage applications in gaming and 3D modelling.

Interactive technology could help students feel what can't be seen http://news.uns.purdue.edu/x/2008b/080922BertolineHaptics.html
Ultrasound to give feel to games http://news.bbc.co.uk/1/hi/technology/7593444.stm
Airborne Ultrasound Tactile Display http://www.alab.t.u-tokyo.ac.jp/~siggraph/08/Tactile/SIGGRAPH08_abst.pdf

Games and learning

More than 600 Scottish primary pupils took part in a research project based on Nintendo's Brain Training software. Learning and Teaching Scotland (LTS), HM Inspectorate of Education (HMIE) and the University of Dundee ran a project that gave pupils a set of activities and puzzles daily, based on the handheld Nintendo DS console, for 20 minutes before they continued their normal studies. Increases in maths scores were higher in pupils involved the project compared to those selected as a control group. No differences were observed between boys and girls, and improvements were similar for those who also had the game at home.

The Games for Learning Institute, based at New York University, is an initiative from Microsoft Research and a group of American universities, designed to 'identify which qualities of computer games engage students and develop relevant, personalised teaching strategies that can be applied to the learning process'. Microsoft Research is providing $1.5 million, which will be match-funded by the universities, to focus on the potential of computer games as learning tools in science, technology, engineering and mathematics among younger secondary age pupils. John Nordlinger, senior research manager for Microsoft Research, said, "while educational games are commonplace, little is known about how, why or even if they are effective".

Computer Games boost maths attainment http://www.ltscotland.org.uk/news/2008/pressreleases/september/news_tcm4506488.asp
Microsoft [and] partners create first scientific-based game research alliance... http://www.microsoft.com/presspass/press/2008/oct08/10-07MSRNYUPR.mspx?rss_fdn=Press%20Releases

Hardware

Analysis: Quantum futures

At a glance

- Quantum computers operate on an entirely different theoretical basis compared to 'classical' computers.
- Quantum measurements are grounded in probabilities, making a full range of outcomes impossible to predict.
- Quantum cryptography relies on this uncertainty to secure communications from eavesdropping.
- Quantum computers can store and process information on a basis exponentially greater than 'classical' counterparts, leading to solutions to problems that would otherwise be intractable.
- Beyond cryptography, commercial applications of quantum theory are generally thought to be years away.

Introduction

Quantum mechanics casts a very different light on subatomic physics compared to 'classical' Newtonian assumptions. When quantum principles take over, particles display extraordinary behaviour, such as being able to be present at more than one place simultaneously. This leads to new ways of solving problems, including cryptography and solutions to complex search algorithms.

Quantum principles

Late in the nineteenth century, experimental results began to call into question the traditional interpretation of light appearing as a waveform. This led to the discovery that light could be described in discrete 'quantum' units, now known as photons, and that other fundamental particles like electrons behaved in a similar way. Further work early in the twentieth century demonstrated that a single photon could pass through two slits in a screen simultaneously. This phenomenon is a direct evidence of 'quantum superposition' - a theoretical construct that describes how subatomic particles can be in two or more seemingly contradictory states at the same time.

The superposition of the states of particles is described mathematically by a 'wave function' which is time-dependent and gives a probability a particle will be found in a particular state when it is measured. When the state of the particle is measured this wave function 'collapses', leading to a problem known as the Heisenberg 'uncertainty principle', named after the theoretical physicist who first described it. Underlying the uncertainty principle is the fact that two linked states of a particle, such as position and momentum, cannot both be known to any degree of accuracy - the very act of measuring one destroys information about the other.

Experimental systems can be created to ensure, or 'prepare', certain physical states of quantum particles. However, the principles of quantum mechanics mean that only one state can be prepared with absolute certainty.

When created, fundamental particles may become 'entangled', such that both will display complementary states when measured, even when separated spatially. Due to the probabilistic nature of quantum mechanics, these states cannot be known in advance for either of the entangled particles, but once one particle of an entangled pair has been measured the state of the other can be predicted with certainty. This effect can be used to manipulate information in quantum computers and transmit quantum information over long distances.

Cryptography
Most classical encryption systems used to secure internet payments and provide other kinds of private communication rely on 'public key encryption': the person needing to receive information passes a public key to the other party, who uses the public key to encrypt the message. Once encrypted, the message can only be deciphered using a 'private' key that the recipient kept secret.

Public key encryption relies on multiplying two large prime numbers - the larger the numbers, the more secure the process becomes. Breaking the cipher relies on attempting to factorise the result by mathematically calculating the prime numbers first multiplied. This can be done by trial and error, although the probability of getting the answer quickly is extremely low. Some weaknesses in the encryption algorithms can shortcut this process, but a 'brute force' attack may take many weeks or even centuries to perform.

Quantum cryptography
Quantum cryptography only relates to the generation and distribution of a private key - if the key is a one-off, private piece of data the communication is theoretically completely secure. A random key is created by sharing and eliminating information using quantum methods. The most common transmission medium uses quantum information (such as polarisation) encoded on photons, which can either be routed using fibre optics or through open air. In order to complete the key selection and eliminate the possibility of an eavesdropper, a classical communication channel has to be used.

Any attempt to interfere with the transmission to read the information sent is likely to disturb the original quantum state of the particles. Due to equipment inaccuracy, there will always be some error in quantum measurements; however, if the error rate rises unexpectedly it would indicate that an eavesdropper is attempting to intercept the communication.

Once the 'quantum key distribution' process has been completed, and the two parties are satisfied as to the reliability of the result, the key can be used to encrypt information sent over classical communication channels. It is still possible for an eavesdropper to perform a so-called 'man-in-the-middle' attack, but both communication channels would have to be broken into. A number of other potential

attacks have been demonstrated based on weaknesses in the detectors used to measure the quantum states.

Siemens, Bristol University and other partners have demonstrated a prototype system working across a real-world fibre optic network around Vienna, Austria, using multiple nodes and links up to 82km long. Siemens has stated that commercialising the main chip underlying the demonstration will take two years. A number of companies, for example id Quantique, already market systems that generate quantum keys for parties connected on a point-to-point (such as line of sight) basis.

Quantum computing

Current computers rely on bits (1s and 0s) to represent data - a system with 3 bits can represent 2^3 states, although the hardware can only store one of those eight states at a given time. Quantum computers use qubits (quantum bits) that, due to superposition, can represent all possible states at once. Thus, with three qubits, a quantum system could represent all eight states simultaneously. As the number of qubits increases, the amount of storage and processing capacity will increase exponentially.

Problems that become exponentially more difficult (such as cracking a public key encryption system) as the input data (such as size of key used) increases are very difficult to tackle using a standard computer, as the amount of time to achieve a definite result also increases exponentially. However, the exponential nature of quantum computing can reduce the time taken to solve the problem from weeks or centuries, to possibly hours or seconds. However, due to the probabilistic nature of quantum mechanics and inaccuracies of the detectors, the result produced is governed by probability. To improve accuracy, the same experiment is repeated a number of times such that, if a particular result continues to emerge, the solution can be considered correct with very high probability.

In addition to breaking encryption keys, another identified use has been finding an item of data in an unsorted database. Many other problems might be speeded up but would not justify the complexity of a quantum system; generally, improving the speed of a classical computing system would be both more effective and would produce a definite result. Simulation of problems in quantum physics and molecular design for new drugs are just two of examples of where a quantum approach may yield benefits.

Just as classical computer bits have to be represented physically to be processed, qubits need a physical medium in which to be expressed. A range of physical phenomena have been proposed, including spin on an electron or nucleus of an atom, polarisation of photons, location of an electron on a 'quantum dot' pair and various properties of superconducting materials.

One of the greatest practical barriers is 'decoherence' - the leakage of information from qubits through random interactions with the physical environment. Scientists from Oxford University, Princeton and Lawrence Berkeley National Laboratory have demonstrated a system that uses the speed and flexibility of an electron from a

phosphorous atom to perform operations, but which then stores the information inside the associated nucleus. Information was preserved for about 1.75s - above the one second minimum threshold considered practical.

Other problems involve accurately measuring the states of qubits, setting them to the desired initial state and creating a large enough number of qubits to actually achieve something useful.

D-Wave has claimed that a particular approach, known as adiabatic quantum computing, will form the basis of a hardware solution to be marketed next year, although theoretical physicists have questioned whether the particular implementation will yield the 'quantum leap' in processing power anticipated. Some other quantum computing milestones are listed at How Stuff Works.

Conclusion

Many believe that practical quantum computing is as much a theoretical construct as a physical reality at present. Further, it will only be able to achieve significant gains for a limited range of problems that could 'never' be solved by classical means. It is certainly not something that is likely to become a part of mainstream, desktop computing in the short term.

Much of the scientific work on quantum effects is highly experimental, designed to prove various aspects of quantum theory rather than creating systems that could be implemented in the short to medium term. Although many experiments have been successful, controversies exist around the interpretation of key concepts, especially entanglement. A number of large companies have been involved in research on various aspects of quantum theory, including HP, IBM, Microsoft, Mitsubishi, NEC, NTT, Siemens and Toshiba.

The only application which is likely to be widely commercialised in the next five years is quantum key distribution - which may be taken up by financial, government and military organisations for highly secure communications - everything else is thought to sit within a time frame of a decade or more.

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Adiabatic quantum computing
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How quantum computers work http://computer.howstuffworks.com/quantum-computer2.htm

Hardware news

Processor developments

VIA has begun to ship its 65nm 'Intel-compatible' Nano processor. Although it uses larger transistors - Intel is beginning to roll out 32nm technology while AMD are switching to 45nm designs - it consumes less power than some of its rivals, at just 5W for a 1GHz processor. VIA claim performance will benefit from its more complex 'superscalar' architecture. In principle, instructions can be sent to any functional unit within the processor rather than having to proceed through an ordered logic pipeline, avoiding redundant clock cycles waiting for output to emerge from the pipeline. Combined with 'out-of-order execution', where sections of code can be run speculatively in advance of knowing which program branch will be chosen, this approach can speed up processing considerably if it's efficiently managed. Intel chips use similar techniques, but tend to concentrate more on improving pipelines and 'in-order' processing capabilities. VIA suggests that the Nano's high-performance floating-point execution will improve decoding and playback of HD video content and give smooth game play. VIA is reported to be working on dual-core designs.

Intel has begun to ship its dual-core Atom processor, known as Intel Atom Processor 330, aimed at 'nettops' - affordable desktop PCs designed to surf the web and run other basic applications.

Due to American technology transfer restrictions and a desire for industrial independence, China has been developing its own processors. The Godson-3, the latest result of research by its Institute of Computing Technology, is the first to run standard x86 code using hardware simulation. Previous generations of the Godson have been used for low cost PCs based on Linux, but the new chips will be able to run Windows. Planned for release next year under the Loongson brand, it will have four 65nm processing cores in each chip package. On-chip systems will control power usage by shutting down idle units and adjusting clock frequencies, giving an overall consumption of 10W. The design is scalable, so eight and more cores are planned for future versions of the chip.

AMD has shipped its new 4-core 45nm 'Shanghai' architecture processors aimed at the server market. An AMD spokesperson said that the chips would be 20 per cent faster than existing 65nm 'Barcelona' designs. The 45nm 'Deneb' processor designed for desktop PCs should follow soon after. AMD has also announced a new marketing brand, 'Fusion', intended to 'express how we blend our customers' needs, dreams and desires with our unique passion for enabling innovation'.

ARM is to develop a range of 32nm and 28nm system on a chip (SoC) processors for IBM and other partners. The products will be based on high-k metal-gate (HKMG) technology that permits closer packing of transistors and greater power efficiency,

combining the main processor with integrated memory and interface logic required for use in embedded systems. No target dates were announced for products to emerge from this long term partnership.

IBM has developed a processor design system that deals with the complexities of creating lithographic masks to create 22nm circuits. Due to limitations from even the shortest (ultraviolet) wavelengths of light, current photolithographic techniques are inadequate to print circuits at this scale. 'Computational Scaling' uses mathematical models to precisely control the shape of the masks used to create the required design and to fine-tune the characteristics of the light source to be used.

IBM has also claimed that its eight-socket server chipset designs, based on six-core Intel Xeon chips, are the first to break the one million transactions per minute barrier on an industry-standard database benchmark.

TILEPro technology from Tilera is designed to meet the demands of advanced networking, digital video and wireless infrastructure. Tilera says that its latest chips are 'both high performance and easy to program'. The 64-core TILEPro64 is a multi-core embedded processor with four DDR2 memory controllers and a range of input/output interfaces, enabling it to encode 10 steams of 1080p HD video.

The University of Rochester in New York claims to have the first functioning 3D-optimised microprocessor running at 1.4GHz. Standard processors are built from a 2D array of transistors, which simplifies manufacturing and technical issues like cooling and information flow. However, as fundamental limitations on current transistor density begin to restrict further miniaturisation, the next logical step is to 'build up' into the third dimension, reducing distances between functional units, introducing lower delays and enabling developers to drive processors faster.

Intel Atom rival ships; larger Netbooks coming? http://news.cnet.com/8301-13924_3-10051771-64.html
VIA Nano processor http://www.via.com.tw/en/products/processors/nano
Intel ships dual core Atom for Nettops http://www.intel.com/pressroom/chipshots/chipshots.htm?cid=rss-90004-c1-213105#091908a
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Tilera's TILEPro multicore processors set new performance benchmark http://www.tilera.com/news_&_events/press_release_080922.php

"Rochester Cube" First to Synchronize 3D Circuit
http://www.rochester.edu/news/show.php?id=3247

Storage update

There is heavy competition between standard hard drives and high capacity solid state devices. Hard drives containing spinning magnetic platters (on which the data is recorded) are much cheaper per gigabyte stored than 'flash' memory in USB drive 'sticks', although this gap is rapidly closing. The latter use non-volatile NAND technology, which has no moving parts. NAND memory incorporates wear levelling techniques, as each 'cell' has a life expectancy of around 100,000 read-write cycles, but it is not subject to the physical wear due to moving parts and accidental damage associated with normal hard drives. Where multiple NAND units are arranged and controlled in a manner that looks like a hard drive to the operating system, they are known as solid state drives (SSDs).

Two major types of NAND are now available: single-level cell (SLC) and multilevel-level cell (MLC). SLCs store one bit of data in each cell, but have faster access times, lower power consumption and greater endurance; MLCs, as the name suggests, can store four or more bits in each cell using multiple charge levels. MLCs are cheaper to produce but need more sophisticated control software to protect against higher data error rates.

In September, Toshiba claimed to be the first company to produce a standard 1.8-inch hard drive capable of storing quarter of a terabyte (approximately 250GB) of data. Using the increasingly common SATA connection, it can transfer data at up to 300MB per second. These small 1.8-inch drives consume less power and make less noise than larger drives, making them particularly suited to notebook computers and other mobile devices.

The next day Toshiba announced a 256GB 2.5-inch solid state drive based on MLC NAND technology, to enter production by the end of this year. Reading data in sequential mode, this drive can achieve speeds of 120MB per second, but writing is limited to 70MB per second. These drives are also aimed at notebook PCs, although Toshiba also announced smaller drives for netbooks and other smaller mobile devices such as MP3 players.

In October, Intel launched its own 'enterprise-class' X25-E SSDs based on SLC NAND memory. The drives are $695, 2.5-inch 32GB units, which can operate at 250MB per second for sequential reads and 170MB per second for writes. Intel claim low power consumption (up to 20 per cent of that used by standard drives), high speed and high reliability. 64GB versions are also expected soon.

Write operations in SSDs are much slower than read operations due to the way that data is first erased before being overwritten. Recent research has shown that this may make SSDs slower than traditional hard drives in the 'real world', especially where writes comprise many smaller blocks of data randomly distributed in the drive's memory. (For example, caching a series of web pages.) SanDisk has

introduced a new ExtremeFFS file system to combat this problem. ExtremeFFS caches data to optimise the point at which it is actually written, can use multiple NAND 'channels' simultaneously for different read or write operations and adjusts its virtual drive 'map' to attempt to optimally locate user data so that it tends to be read in sequential blocks. SanDisk claims that the new file system, which will learn usage patterns to further optimise reads and writes, can improve performance by up to 100 times.

Other hard drive manufacturers include Seagate and Western Digital, and SSD manufacturers include Micron and Samsung.

Toshiba introduces industry's first quarter-terabyte 1.8-inch HDD...
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Optical storage

Existing Blu-ray disks can store up to 50GB of data, but a new blue laser diode from Sanyo promises to double that by creating four data layers instead of two, in addition to improving writing speeds, such that 100GB could be written in less than ten minutes. Large capacities and fast speeds would make these disks ideal for backup in some environments. The technology would need to be approved by the Blu-ray Disc Association before products could be manufactured, so Sanyo does not expect consumer devices before 2011.

The research arm of US conglomerate GE has developed a holographic storage system, based on the standard DVD disk format, which could provide 300GB of storage in products available from 2012. Holography is based on capturing interference patterns produced by interacting laser beams in an optical medium, instead of creating the physical 'indentations' (properly known as pits) used in existing optical disks. Data is stored in single-bit holograms arranged as a fixed pattern across each of 21 layers in the disk. Drives would be backward compatible with existing CD and DVD formats, but could hold as much as a terabyte (1024GB) by using over 50 recording layers in the fairly near future.

An existing holographic system from InPhase, to be marketed at the end of next year, will also hold 300GB, but will be much more expensive due to using non-standard disk manufacturing techniques and using a 'page'-storage format. In this format data can overlap, requiring sophisticated laser control systems to read the data from the correct angle. Hardware is expected to cost $18,000 and disks $180.

Sanyo promises 100GB Blu-ray discs
http://www.vnunet.com/vnunet/news/2227949/sanyo-promises-100gb-blu-ray
An easier upgrade to holographic storage
http://www.technologyreview.com/computing/21507/?a=f
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Battery updates

Consumer electronics devices, like iPods, and educational hardware with integrated batteries may need to be redesigned to comply with European law. In the new directive, which came into law in September, it states that all batteries should be 'readily removed' for recycling, so that heavy metals and other contaminants would not end up in landfill. Nevertheless, this wording is ambiguous in some people's eyes, so agreed protocols may take time to emerge. (Also see other details in the 'Battery recycling' article in TechNews 09/08.)

Using a specifically configured laptop with its optional 'ultra-capacity' battery, HP claims to have run one of its models for 24 hours using a single charge. Although owners are unlikely to achieve these usage figures, other than under optimum conditions, the test is a practical demonstration of how much power can be saved by using solid state drives (rather than standard hard drives), screens lit by LEDs (rather than cold cathode fluorescent tubes) and other techniques.

Toshiba has demonstrated a prototype fast-charging 'Super Charge Ion Battery' (SCiB) in a laptop computer. They say it 'can recharge to 90-percent power in less than five minutes' and will endure as many as 5,000 recharge cycles - ten times more than a standard lithium-ion battery. Although being marketed in an electric bicycle, Toshiba could not say when the technology would be commercially available for computers.

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http://www.hp.com/hpinfo/newsroom/press/2008/080908a.html?mtxs=rss-corp-news
Fast-charging laptop battery demoed
http://www.techworld.com/news/index.cfm?RSS&NewsID=105016
Environmental Vision 2050 Spotlight
http://www.toshiba.com/csrpub/upload/page/100253/toshiba_environmentally_conscious_products.pdf

Fuel cell to launch

Direct methanol fuel cells use methanol as a source of power for consumer devices and computers. Producing only water and a small amount of carbon dioxide, they have been suggested as an alternative to batteries for quite a number of years. In the short term, it is likely that fuel cells will be used more commonly to recharge rather than replace batteries, or act as an 'emergency' power source. (See TechNews 09/08.)

Toshiba is reported to be marketing its first fuel cell-based consumer device before the end of March 2009. The company has kept precise details to itself but, based on a prototype demonstrated in September, analysts suggest that it is likely to be a mobile phone rather than a laptop computer.

Panasonic has reduced the size of its prototype laptop fuel cell, first demonstrated in January 2006, to 270 cubic centimetres - equivalent to a standard battery. The device has a peak output of 20 watts and can produce an average of 10 watts of power. Weighing 320 grams, Panasonic said that a 200cc charge of methanol will deliver power for up to 20 hours. When the fuel runs out, it should be a relative quick and simple task to top up the reservoir. The company has also demonstrated a stand-alone charger powered by a fuel cell for USB-based products, such as MP3 players and some mobile phones. Panasonic aims to market these devices by the end of 2012.

Toshiba to release fast-charging fuel cell
http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=105332
Panasonic chops size of new fuel cell
http://www.techworld.com/news/index.cfm?RSS&NewsID=105927

Remotely securing 'mobile' data

Hardware and data loss have become a very public problem over the last year. Alcatel-Lucent has launched an updated OmniAccess 3500 Nonstop Laptop Guardian PC Card, to protect hardware from unauthorised access, which can use faster HSPA as well as standard 3G mobile protocols. It is designed to work in the 'mobile blind spot', while the user is on the move, where a laptop is out of reach of normal network security measures. A CardBus PC card, with its own onboard processor, non-volatile memory, radio receiver and rechargeable battery, remains constantly connected to the 3G network to implement organisational security policies, create remote virtual private network (VPN) connections and carry out background activity, such as software patch download and installation. Client software is used to manage an encrypted volume for sensitive data and enforce a range of anti-tampering measures.

The system administrator manages access to all OA3500 devices within the enterprise through a server-based 'gateway appliance'. Users who move into areas without 3G access can be issued with single use passwords that give access for a predetermined period. Where a laptop is deemed lost or stolen, the administrator can issue a 'remote kill' command to further secure data within the PC's encrypted volume by deleting the hidden passphrase used for encryption, although that phrase is retained centrally in case the laptop is recovered.

The Alcatel-Lucent press release gives no information about availability of the card in the UK. A range of other encryption and remote access management solutions is available.

Alcatel-Lucent's unique mobile security solution... http://www.alcatel-lucent.com/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLd4x3tXDUL8h2VAQAURh_Yw!!?LMSG_CABINET=Docs_and_Resource_Ctr&LMSG_CONTENT_FILE=News_Releases_2008/News_Article_001295.xml
OmniAccess 3500 Nonstop Laptop Guardian http://www1.alcatel-lucent.com/com/en/appcontent/opgss/ENT_Apps_OA3500NLG_Features_Overview_0208_EN_tcm228-1391991635.pdf

Instant-on booting

A number of hardware manufacturers are developing low-functionality 'instant on' booting for their PCs. Dual-boot systems use Linux written to into a BIOS ROM to enable access to online email, calendar, contacts and web browsing applications at speeds as fast as 8 seconds after switching on.

One such system is Dell's 'Latitude ON', already available in its Latitude E4200 and E4300 notebooks. These laptops are able to synchronise with remote servers running Microsoft Exchange to retrieve email and update calendars and contacts. Dell suggests that these laptops, which combine the instant-on system with an alternate low power processor, could achieve 'multi-day' battery life.

Asus is using DeviceVM's Splashtop software in a range of its products under an Express Gate branding. Asus claims start-up times as low as 8 seconds, 'subject to system configuration', for email, instant messaging, photo sharing and other applications. A DeviceVM press release states that Lenovo will also be providing a QuickStart option on its IdeaPad S10e netbooks (aimed at education in the US).

A survey from Microsoft is reported to be sounding out user demand for instant-on booting.

Dell takes business laptops to new Latitudes...
http://www1.euro.dell.com/content/topics/topic.aspx/emea/corporate/pressoffice/2008/uk/en/2008_08_12_brk_000?c=uk&l=en&s=corp
ASUS Notebooks Offer 8-Second Boot Up…
http://www.asus.com/news_show.aspx?id=11535
DeviceVM and Lenovo Bring Splashtop to Netbooks
http://www.splashtop.com/press_releases_detail.php?Id=30
Microsoft considers 'instant on' feature for Windows
http://news.zdnet.co.uk/software/0,1000000121,39520157,00.htm

Liquid camera lens

Focusing normally involves physical movement of a glass or plastic lens, but changing the surface curvature would also adjust the focal length. Researchers are

investigating various types of liquid lens to achieve a workable system which could be focused rapidly in a limited space, such as in a mobile phone's camera.

Varioptic's liquid camera lens, first mentioned in TechNews in March 2007, has now been embedded into 1.3 and 2.0 megapixel, variable focus webcams. The lenses have no moving parts, enabling noiseless autofocus in Akkord's S1300 and S2000 AF SnakeCams. These lenses use a voltage to control the curvature of the interface between oil and a water-based solution, trapped between two thin glass plates, in order to adjust the focus.

Assistant professor Jiang and a student at Wisconsin-Madison University have also investigated the water-oil interface to focus light. Their latest system uses a hydrogel doped with gold nanoparticles that absorb infrared light to manipulate tiny droplets. They envisage immediate applications in medical imaging, where optical fibres could channel the infrared light, but foresee wider applications in imaging and sensing.

A research team at Rensselaer Polytechnic Institute has created a new mechanism for controlling the curvature of the lens using sound. A fine Teflon cylinder is slightly overfilled with water, creating paired droplets which can be manipulated with sound waves. This system uses less power than Varioptc's lens, but the constant, micro-vibrations mean that the lens is out of focus much of the time as the droplets move back and forth. Professor Hirsa proposes that a series of images are taken at up to 250 frames per second and image analysis software used to select those that are best focused. The current system is fairly low resolution.

Researchers at University of Illinois have developed a system (although not a liquid lens) for stretching an array of light sensors across a silicon dome. Due to its curvature, it produces less distortion and creates a more faithful image at lower resolutions compared to flat sensor array.

Varioptic Liquid Lens in Autofocus Webcams
http://www.varioptic.com/en/news/newsroom01.php?code=134
Tunable microlenses shine light on medical imaging
http://www.news.wisc.edu/releases/14824
Low-power liquid lens http://www.technologyreview.com/Infotech/21449/?a=f
From the labs: information technology
http://www.technologyreview.com/computing/21546/?a=f

Computing for students in developing nations

Venezuela has become the latest country to order one million laptops, founded on Intel's Classmate PC design, for its school children. Based on an original deal with Portugal (see TechNews 09/08), who will manufacture the hardware under licence from Intel, the laptops will run a localised version of the Linux operating system. Other developing countries have contracted to buy the OLPC's XO laptop.

The state government for Andhra Pradesh in India have chosen NComputing's low cost solution for its school computer suites to serve the state's 1.8 million children. The X300 system allows up to seven people to share the processor on a single PC

by creating virtual desktops for each user, significantly cutting hardware costs. The system uses PCI cards to give each user their own keyboard, monitor and mouse, plus dedicated access to attached USB devices as required. Software is licensed through Microsoft's Unlimited Potential scheme, which was launched to promote ICT in the developing world. NComputing claims that its system saves 90 per cent on electricity bills and will cost $70 per seat. The whole project is based on a 'build, operate and transfer' outsourcing model that hands the complete control of a school's ICT suite to external suppliers for the contracted 5-year period.

Venezuela splashes out on laptops
http://news.bbc.co.uk/1/hi/technology/7642985.stm
NComputing wins bid to provide computing access to 1.8 million students in India
http://www.ncomputing.com/tabid/180/default.aspx?ContentID=172

AI tests: nearly intelligent?

In 1950 Alan Turing, who devised much of the theoretical foundation of modern computing, proposed a test to see whether a computer was truly acting as an 'intelligent' agent or just as a cleverly programmed terminal: a human 'judge' is placed on the other side of a screen and asked to interact with a system that may be controlled by either a computer or a human; if the judge cannot tell the difference, the computer is acting just as 'intelligently' as the human. To ensure that it is the logic and not the interface that is determining the outcome, both the human and the computer 'subjects' use text-based conversation.

In a Turing test run by the University of Reading in October, using five different 'chat bots' and twelve human judges for each, some of the artificial intelligence (AI) systems were able to mimic humour and managed to parry quite sophisticated attacks on their integrity. Fred Roberts' Elbot system managed to fool a quarter of the judges, winning the bronze medal for this feat. Hugh Loebner, an American scientist and philanthropist, has underwritten the prizes for the annual competition since 1991. The awards are based on absolute performance, rather than rank, so no silver or gold could be presented.

The whole concept of the Turing test remains controversial, as some commentators believe that it can be won through sophisticated trickery rather than genuine intelligence - even this year's winner, Fred Roberts, said, "If you know a magic trick, you know how it's done, it's not magic anymore. Sorry to be so pessimistic."

UK university holds artificial intelligence test http://www.itworld.com/node/56016

Software and internet

Analysis: Web 2.0 in education (KS3&4)

At a glance

- A series of reports has examined the use of Web 2.0 by secondary age learners at home and at school.

- Young people use Web 2.0 considerably more frequently at home, but they are often 'consumers' rather than 'producers' of digital information.
- A number of schools are innovating in use of Web 2.0 in education, but a range of institutional, technical and sociological barriers to widespread adoption remain.
- The pedagogical models implied by wider use of Web 2.0 technologies are not entirely new, but they challenge a number of important assumptions about the way that formal education is currently constructed.
- The researchers recommend a strategy of 'empower and manage', while acknowledging that progress towards Web 2.0 approaches is likely to be 'slow and cautious'.

Introduction
Becta has published a series of five reports on Web 2.0 in secondary schools, based on research commissioned from the University of Nottingham in conjunction with London Knowledge Lab and Manchester Metropolitan University. According to the authors:

> 'Web 2.0 is a catch-all term to describe a variety of developments on the web and a perceived shift in the way the web is used. This has been characterised as the evolution of web use from passive consumption of content to more active participation, creation and sharing - to what is sometimes called the "read/write" web.' (Report 5, page 9.)

The research was designed to find out how Web 2.0 is being used, its potential impact in education and some of the barriers to successful adoption. A suite of five reports has been published:

- The current landscape - opportunities, challenges and tensions (Report 1)
- Learners' use of Web 2.0 technologies in and out of school in Key Stages 3 and 4 (Report 2)
- Implementing Web 2.0 in secondary schools: Impacts, barriers and issues(Report 3)
- E-safety issues in using Web 2.0 (Report 4)
- Web 2.0 technologies for learning at Key Stage 3 and 4: summary report (Report 5)

Conclusions are based on existing research, surveys, focus groups, interviews and case study evidence. Two groups of schools were identified: 12 schools selected on the basis of their innovative use of Web 2.0 technologies and 15 schools that were chosen as broadly representative of the national demographic. Throughout this article the reports will be referenced by their number (above) rather than the full title.

This research complements other reports into use of Web 2.0 technologies, or social networking in particular, such as *Young people and social networking services* (Childnet, funded by Becta), *Social Networking: A quantitative and qualitative research report into attitudes, behaviours and use* (Ofcom), *Information behaviour of*

the researcher of the future (University College London/JISC) and sections of the Byron review (DCSF).

Students' experience out of school
Report 2 publishes details of young people's use of Web 2.0 technologies, across a broad spectrum of applications based on the definition given above. Over the half the pupils surveyed had used a search engine or instant messaging application within the last 24 hours; nearly half had used a social networking site (such as Bebo or Facebook) or email. More learners from the 'Web 2.0' schools had used these technologies, although the difference was in the order of two to six per cent, depending on the application. In general, younger pupils and boys were more interested in gaming, while older students and girls were more likely to be found using social networking and communication software.

Home access to the internet was almost pervasive, with 96.6 per cent from the total sample able to get online. Nevertheless, many of these learners shared access with other family members and nearly all schools had some learners without any kind of home access.

Large numbers of young people are uploading content to the internet out of school - 73 per cent would upload pictures and 49 per cent share video - and almost three quarters are using social networking sites. Fewer students are using text-based contributory sites, such as blogs (53%) or wikis (17%).

Learners (Report 4) frequently interact with people they do not know, with 41 per cent 'occasionally' or 'frequently' receiving instant messages from unknown contacts and 35 per cent of these replying to them; 42 per cent 'keep up friendships' via social networking sites with people they have never met. The researchers conclude, however, 'this does not, of itself, indicate that children are naive or are engaging in behaviour that puts them at significant risk.' (Report 5, page 29.) Around half the students have, at least 'rarely', seen text or pictures about themselves that they did not like. Basic security is an issue for some: 28 per cent of learners 'occasionally' or 'frequently' find out others' passwords and 52 per cent would select passwords based on personal data.

Given the widespread use of such media by young people, the researchers see a role for schools in educating learners about the range of emerging technologies, the digital literacy skills needed to use them effectively and how to remain safe in this space. They state that, 'learners need to be offered appropriate ways in which to build on their enthusiasm and the fledgling technology skills they gain out of school'. (Report 2, page 11)

Current use in education
Report 2 compares school use of technologies, including Web 2.0, with experience at home, finding considerably fewer learners accessing these technologies during their formal education. Only two applications, email (40%) and looking up information in Wikipedia (73%), are used by more than a fifth of students; uploading pictures

(7%) and video (6%), writing in blogs (9%) or wikis (9%) and use of social networking sites (8%) are experienced by a small minority.

Report 3 goes into greater detail of the actual use of Web 2.0 tools in the 12 case study schools, examining each technology in turn. Teachers in these schools experienced problems accessing the tools and the sample is small, so it is difficult to provide conclusive statistical evidence. Blogs and wikis were being used with students for open-ended writing tasks, collaborative development of text, debate, sharing comments and reviews, peer assessment and collating research. Various 'conversational arenas' were used for debate, supporting students and as a medium in which quieter students felt more able to contribute. Three quarters of teachers considered it important that pupils gained experience uploading and sharing media.

Skills and attitudes of students and teachers
The researchers found considerable enthusiasm among pupils for Web 2.0 activities, but that, 'there is little evidence of groundbreaking activities and only a few embryonic signs of criticality, self-management and metacognitive reflection'. (report 2, page 6) This lack of experience carries over into school, where teachers find that many students uncritically copy and paste text when engaged in learning activities and that 'digital consumers are more prevalent than digital producers'. (Report 2, page 8)

Learners, on average, spend more time at home using ICT for school work - a third estimate that they spend only an hour a week using ICT in school. Both teachers and learners experience problems of access to hardware at school and restriction policies that they find unhelpful.

Teachers do use Web 2.0 tools, but more often for social than professional purposes. Report 3 reveals that 46 per cent of teachers across the schools used social networking sites personally, but only 7 per cent used them for planning or delivering learning and teaching; likewise around 18 per cent used blogs but only 8 per cent professionally.

Teachers are apprehensive about many aspects of new technologies, not just Web 2.0 - 64 per cent say they have 'rarely' or 'never' received training. In addition to more technical issues around access, software skills and support, concerns include appropriate educational use, copyright, e-safety and assessment strategies. Over a third of the teachers surveyed believe that introducing Web 2.0 approaches into learning will be time-consuming and nearly two thirds experience 'frequent' or 'occasional' problems managing learners' use of the internet.

Pedagogical opportunities for Web 2.0
The researchers suggest that a 'significant reason for educators to turn to Web 2.0 is that it seems to fit with certain experiences emphasised in contemporary theories of learning and modern thinking about how best to design the conditions of learning'. (Report 1, page 30)

Report 3 identifies four major ways in which Web 2.0 may impact learning:

- Stimulating new modes of enquiry
- Supporting collaboration
- Engaging with new literacies
- Generating publication.

Each of these is examined and examples of relevant activities are drawn from the case study schools. Appropriate use of Web 2.0 also affords opportunities to develop personal, learning and thinking skills (PLTS), creating an environment in which students can be critical, reflective and self-managing, developing metacognition through activities undertaken. Changes in pedagogy implied by Web 2.0 are not unique to the technology, but may be 'new' to many learners, educators and institutions. It is important for schools to consider what they want to achieve and whether the technology will deliver these learning goals.

Web 2.0 and beyond in education
Many of the Web 2.0 approaches being adopted by innovative teachers strongly support policy initiatives that emphasise personalisation and assessment for learning. However, the researchers identify two 'important insights':

- 'The first is that one of the reasons Web 2.0 has been slow to make a deep impact is because it demands new modes of learning from students;
- 'the second is that Web 2.0 applications result in new products of learning, and teachers and schools will need to find ways to accommodate these into new curriculum practices.' (Report 5, page 34.)

The whole landscape of Web 2.0-enabled learning is changing rapidly, with more research needed. Report 5 derives a set of policy implications from the evidence they gathered, impacting on issues such as home access, assessment systems, training and e-safety. Meanwhile, technology analysts are starting to talk about Web 3.0, or the 'intelligent web', combining natural language input, artificial intelligence and pro-active data-mining to draw out the information users require.

In relation to e-safety, an advisory panel of 30 experts strongly recommends a technological approach to web access that they termed 'empower and manage' (report 4) - learners are educated, granted access and monitored, with inappropriate behaviour dealt with as necessary. Due to the fundamental shift in pedagogy towards more learner-controlled, collaborative approaches implied by the effective use of Web 2.0 technologies - and the accompanying need to change the mindsets of educators and strategists - the authors recommend that Web 2.0 innovators 'recognise that relatively slow and cautious progress is inevitable' (report 5, page 45.).

References
Web 2.0 technologies for learning at KS3 and KS4 - Project overview
http://partners.becta.org.uk/index.php?section=rh&catcode=_re_rp_02&rid=14543

Young people and social networking services (Childnet/Becta)
http://www.digizen.org/socialnetworking
Social Networking: A quantitative and qualitative research report... (Ofcom)
http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/socialnetworking
Information behaviour of the researcher of the future (JISC)
http://www.jisc.ac.uk/media/documents/programmes/reppres/gg_final_keynote_11012008.pdf
Byron Review http://www.dcsf.gov.uk/byronreview

Software and internet news

Online reporting briefings

Becta is working with the Specialist Schools and Academies Trust (SSAT) to deliver a programme of briefings about the Government's requirements for online reporting.

As you may be aware, as part of an approach to improve parental engagement, all secondary schools are expected to make the following information available to parents via secure online access by September 2010:

- Attendance and behaviour
- Progress and attainment
- Special needs.

To help schools with this, SSAT, on behalf of Becta and DCSF, will deliver a series of briefings for secondary school leaders - local authorities are also welcome to attend to share their experiences of supporting schools.

These briefings will include:

- clarification of DCSF expectations for September 2010
- information from Becta and the SSAT about parental engagement and online reporting
- discussion with colleagues about improving practice and overcoming barriers to progress.

The briefings will last half a day, starting at either 10am or 1.30pm, and will take place as follows:

London - 19th November, Kensington
West Midlands - 21st November, Birmingham
Yorkshire & Humberside - 25th November, Sheffield
South West - 2nd December, Bristol
East England - 5th December, Cambridge
East Midlands - 11th December, Leicester

To book, click 'Events list' at: http://www.ssatrust.org.uk/events (You will need to create an account or sign on.)

The May 2008 issues of TechNews had an analysis piece entitled 'ICT to improve parental engagement: towards online reporting' and the Becta website has a range of resources available to support the implementation of online reporting.

Online reporting (Becta)
http://schools.becta.org.uk/index.php?section=oe&catcode=ss_es_fam_onrep_03

Home broadband access for pupils

The Government announced in September an investment of £300 million to provide home internet access to disadvantaged learners in England. The announcement follows a recommendation from the Home Access Taskforce that every 5-19 year-old should be able to log on to the internet at home by 2011. 'Home Access' vouchers will cover the purchase of approved laptops and installation of broadband for families who qualify under the scheme. There will also be technical support and advice on using ICT safely and effectively for learning.

Two authorities, Oldham and Suffolk, will be used to pilot the scheme from February 2009. Eligible families will be able to 'top up' the value of the voucher to purchase higher specification systems and other parents will be able to purchase approved packages on the same terms. Approved packages will carry a Next Generation Learning @ Home mark as an assurance of their 'educational and technical quality'. All LAs will be invited to submit proposals for providing access to looked-after children and other young people for whom they have responsibility, with £20 million of funding available in 2008/09.

Becta has a Home Access microsite on which details of the scheme will be released, including information for companies that want to be accredited as suppliers.

Broadening horizons - England to 'lead the world'...
http://www.dcsf.gov.uk/pns/DisplayPN.cgi?pn_id=2008_0208
Next steps in the home broadband and computer revolution
http://www.dcsf.gov.uk/pns/DisplayPN.cgi?pn_id=2008_0234
Home Access http://becta.org.uk/homeaccess

E-safety update

As promised in the Government's response to the Byron Review, the DCSF has formed a new UK Council for Child Internet Safety (UKCCIS). Over 100 public and private sector organisations will work together to promote effective regulation and safe use of the internet. As its first major output, the UKCCIS will consult with young people, parents, industry and other stakeholders to produce a Child Internet Safety Strategy early next year. The strategy will encompass an awareness campaign, voluntary codes of practice for user-generated content sites, online advertising to children and measures to protect vulnerable young people. Existing e-safety advice for schools can be found on the Becta website.

The European Parliament has approved the Commission's plan aimed at providing a safer internet environment for children. Building on the existing Safer Internet programme, 55 million Euros will be spent over five years from 2009 on a variety of projects to combat issues including illegal content distribution, online grooming and cyberbullying. The plan requires final approval by the Council of Europe later this year.

EU governments, through European Schoolnet, and industry representatives have worked together to form the TeachToday website. In addition to teaching about how mobile and internet technologies work, the site aims to help teachers 'find resources to support the teaching of positive, responsible and safe use of ICT'. The site will include policies, lesson plans and teaching ideas.

New provisions came into force on 1 October 2008 after the Computer Misuse Act 1990 was amended by the Police and Justice Act 2006. These cover deliberate impairment of the operation of computer systems (including denial of service attacks) and increasing the penalty for hacking. The former can result in a prison sentence of up to 10 years and the latter 2 years.

Government launches new UK Council for Child Internet Safety
http://www.dcsf.gov.uk/pns/DisplayPN.cgi?pn_id=2008_0215
Byron Review Action Plan http://www.dcsf.gov.uk/byronreview/actionplan
E-safety (Becta) http://schools.becta.org.uk/index.php?section=is
Commission welcomes European Parliament's strong support...
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1571&format=HTML&aged=0&language=EN&guiLanguage=en
TeachToday http://en.teachtoday.eu
Amendments to Computer Misuse Act come into force
http://www.pcadvisor.co.uk/news/index.cfm?newsid=105122
Police and Justice Act 2006 (see sections 35-37)
http://www.opsi.gov.uk/Acts/acts2006/pdf/ukpga_20060048_en.pdf

New Windows, new Office

Participants at Microsoft's Professional Developer Conference in October were given an early (pre-beta) copy of the next version of their desktop operating system, to be called Windows 7. The company made clear that the main kernel and operating system essentials remained relatively unchanged, so the product should not have the software and driver compatibility issues that many found when Windows Vista was released at the end of 2006. Adjustments have been made to the way the new operating system loads software services, to ensure that it starts faster and uses fewer resources - Microsoft says that it runs well on a netbook with 1GB memory. Among other changes, 'native' support is now offered for multi-touch functionality; the interface, especially the Taskbar, has been redesigned; and changes have been made to features such as user account controls. A public beta is expected early next year and the final product may be available at the end of 2009, although Microsoft made no definite commitment to that.

Microsoft also revealed the next step in its 'software plus services' strategy by demonstrating pre-release versions of its new Office Web applications suite. Although all of a document's characteristics will be preserved when documents are used online (to ensure two-way portability), the online versions of Word, Excel and PowerPoint will be 'lightweight', removing access to some of the more complex functions, to ensure the programs operate well in the browser. Ad-funded and subscription versions will be available to consumers, while businesses will be able to use existing volume licensing arrangements or opt for a fully hosted service. Document storage will be mediated through the Microsoft Office Live Workspace. This mixed economy, involving full desktop products, is somewhat different to the approach offered by Google's Docs and Yahoo's Zimbra, which are primarily web-based but offer the facility to work in the browser while offline. Beta editions of the web applications are expected next year, but no further details were given of the next desktop (Office 14) versions of the suite expected early in 2010.

Revealed: what's in Windows 7 http://www.pcpro.co.uk/news/233022
Microsoft delivers pre-beta release of Windows 7 to developers...
http://www.microsoft.com/presspass/press/2008/oct08/10-28PDCDay2PR.mspx
Microsoft building an Office in the cloud
http://software.silicon.com/applications/0,39024653,39330302,00.htm
Microsoft to extend Office to the browser
http://www.microsoft.com/Presspass/Features/2008/oct08/10-28PDCOffice.mspx

Mozilla developments

Mozilla's Firefox browser is to support the W3C Geolocation specification, which allows a website to provide location-based information for users who give it their permission. This feature is in recent beta versions of Firefox 3.1 and will appear in Mozilla's mobile browser, but existing Firefox users can download (via the Mozilla Labs blog) an experimental add-on, called Geode, that implements similar code. Like Google's geolocation application programming interface (API) calls, it uses wireless signal strength and a database of known Wi-Fi hotspots to triangulate the user's location. Future versions will also use location data entered by the user or received through a GPS device.

Mozilla has also launched the first alpha version of Firefox for mobile devices, codenamed Fennec. The new browser can only be installed on the Nokia N810 internet tablet at present, but will eventually run on other Linux and Windows Mobile devices. The browser is being built specifically with touch screen devices in view, although navigation using a 'directional pad and two softkeys' will also be supported.

Introducing Geode http://labs.mozilla.com/2008/10/introducing-geode
First alpha of Firefox Mobile released http://www.pcpro.co.uk/news/231612/first-alpha-of-firefox-mobile-released.html
Fennec https://wiki.mozilla.org/Fennec

Software licensing

A new framework agreement for software purchases has been put in place by OGCbuying.solutions and Becta. 12 suppliers have met the conditions to participate in the supply of software, including operating systems, office productivity applications, management information systems (MIS), network management software and data management tools. Supporting services, including procurement advice, technical support and relevant training, are also covered under the agreement. Suppliers can provide a range of proprietary and open source solutions. Becta has also welcomed changes by Microsoft to its licensing agreements and the interoperability of its software.

WMNet, one of the regional broadband consortia, has joined Learning and Teaching Scotland in purchasing licences to the resources in JISC's Collections for Schools. 750,000 learners in the West Midlands will be able to access over 50,000 copyright-cleared images, newspaper archives and other resources covering history, science, modern languages, art and music.

Education Framework
http://online.ogcbuyingsolutions.gov.uk/bcm/ICT/Software/educationframework
Becta welcomes substantial progress in discussions with Microsoft
http://news.becta.org.uk/display.cfm?resID=37559&page=1658&catID=1633
... more than 1 million learners now have access to JISC Collections...
http://news.becta.org.uk/display.cfm?resID=38510&page=1658&catID=1633
JISC Collections for Schools http://www.jcs.nen.gov.uk

Copyright education

The Industry Trust, a trade body representing over 30 films studios and retailers, has launched a section of its website dedicated to explaining what intellectual property (IP) is and why copyright is required. Text and video clips explain the meaning of the terms. A survey for the Industry Trust revealed that one in ten internet users were unable to distinguish illegal and legitimate sources for downloads, while two thirds did not understand the basic concept of intellectual property.

Film and TV industry launches copyright education site
http://www.computeractive.co.uk/computeractive/news/2229488/british-film-tv-industry-aim
The Industry Trust http://www.copyrightaware.co.uk/copyrightclinic/index.asp

Effective Practice with e-Portfolios

JISC has published *Effective Practice with e-Portfolios* as part of a series of guides promoting effective practice. The guide introduces the concept of an e-portfolio, describes its role in personalisation and reflective practice, and considers the views of learners, practitioners, institutions and life-long learners, with case studies for each. It concludes by outlining six steps to implementing e-portfolio-based learning. The guide accompanies an 'infoKit' microsite that provides further information, advice, case studies and resources. Becta has also published research on the use of e-portfolios in learning.

e-Portfolios: Tools for 21st century learning
http://www.jisc.ac.uk/Home/news/stories/2008/09/eportfoliolaunch.aspx
Effective Practice with e-Portfolios
http://www.jisc.ac.uk/media/documents/publications/effectivepracticeeportfolios.pdf
Impact of e-portfolios on learning [research]
http://partners.becta.org.uk/index.php?section=rh&catcode=_re_rp_02&rid=14007

Google Maps and location updates

Google has improved the 'My Location' feature of its mobile Google Maps service. When a user opens the application on a mobile phone, the software triangulates the device against a database of known mobile phone masts to provide an approximate location. Once located, the software places a blue dot on the map and an estimated circle of uncertainty that may, for example, have a radius of 3km. The accuracy will depend on the number of masts, the clarity of signal from each and obstructions from buildings and features in the landscape. The latest version should centre the circle more accurately and give a better estimate of the degree of uncertainty involved in locating the device. This service is available in the UK.

Google has also introduced its Street View service for mobile phones in the US, Australia, France and Japan. Cars have been sent around cities like New York taking photographs (on which people's faces have been blurred out) of complete areas. The intention is to help users locate buildings and businesses, or to clarify driving directions. Images can be panned and the view navigated to move around the locality. Images (which are also available using the normal Google Maps service) could be used in geographical studies to compare locations, or as an exercise in giving directions or describing a view in modern languages.

The UK Highways Agency has announced that it is providing Google with traffic flow data. Information for motorways and trunk roads is overlaid on the display with colours indicating how fast traffic is moving. The service, which is already available, could be used in geography to examine when traffic flows are heaviest and where congestion occurs.

Web developers can now access location data in applications supported by Google's Gears offline web browsing environment, using the relative strength of Wi-Fi signals compared to a database of known hot spots. Gears is supported in a range of browsers, including Google's own Chrome, Internet Explorer, Safari, Firefox and (soon) Opera. Google has provided a single, free geolocation application programming interface (API) for both laptops and smaller mobile devices, so that developers can use the same code on both platforms.

My Location: smaller is better! http://googlemobile.blogspot.com/2008/09/my-location-smaller-is-better.html
Street View and walking directions come to Google Maps for mobile
http://googlemobile.blogspot.com/2008/09/street-view-and-walking-directions-come.html
Highways Agency provides data for new Google maps traffic function
http://www.highways.gov.uk/news/pressrelease.aspx?pressreleaseid=166608

Introducing the Gears Geolocation API for all laptop WiFi users http://google-code-updates.blogspot.com/2008/10/introducing-gears-geolocation-api-for.html

Voice-based web

A research project is underway at IBM's India Research Laboratory investigating the possibilities of a 'spoken web', where users navigate around audio content using voice commands. The main aim is to support users in developing nations who cannot read or write, but who have access to a mobile phone, to get relevant local information and use e-commerce services; nevertheless, the implications for people with visual impairment are obvious. Using the standard telephony network, users visit VoiceSites that have spoken URLs and follow VoiceLinks. Input, including site creation, can be through voice commands or using a tone phone. Sites on the regular internet could be linked but would need to be designed to suit voice navigation and would have to embed VoiceXML (Voice eXtensible Markup Language). The architecture is underpinned by VoiceXML, which has its own industry forum, and the hyper speech transfer protocol (HSTP).

The VoiceXML Forum, founded in 1999 by AT&T, IBM, Lucent and Motorola, is working on Version 3.0 of the VoiceXML specification to put forward to the World Wide Web Consortium (W3C) to be adopted as the next standard.

Yahoo has added voice-based search to its oneSearch application. Holding down the talk button, the user speaks search terms which the Yahoo application will then send to a voice recognition engine to perform the search. Yahoo states that the system will adapt to your voice as it learns and that users can switch between voice and text input. The voice feature is currently only available for RIM's BlackBerry smartphones.

IBM testing voice-based web http://www.itworld.com/tech-amp-society/54855/ibm-testing-voice-based-web
VoiceXML Forum http://www.voicexml.org
Yahoo oneSearch 2.0 slowly spreads voice search http://www.download.com/8301-2007_4-10063351-12.html
Yahoo OneSearch http://mobile.yahoo.com/onesearch/voice

TechNews Information

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