

## June 2007

**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.

Please navigate the newsletter by clicking on items within the table of contents.

<b>Networking and wireless</b> .....	2
<b>Analysis: Intrusion detection and prevention systems</b> .....	2
<b>Networking and wireless news</b> .....	5
IP addresses running out .....	5
MIT demonstrate wireless power .....	5
Wi-Fi certification update.....	5
Developments in WLAN architectures.....	6
WiMAX update .....	7
European 4G tests .....	7
Community wireless in St Helens .....	8
Ofcom news .....	8
EU satellite positioning issues .....	9
GPS on a SIM .....	9
<b>Multimedia</b> .....	9
<b>Analysis: recording lessons</b> .....	9
<b>Multimedia news</b> .....	12
BBC and ITV join up to offer digital satellite .....	12
New tools for mediascape development.....	12
BBC iPlayer approved .....	13
Visions of a mobile TV future .....	13
High capacity colour barcodes .....	14
Displays and electronic paper updates.....	14
Mobile projector developments .....	15
Mobile phone futures.....	15
Text messages and literacy.....	16
Next generation DVD news .....	16
<b>Hardware</b> .....	17
<b>Analysis: 3D printing</b> .....	17
<b>Hardware news</b> .....	21
One Laptop per Child .....	21
New Flash hard drives shown at Computex .....	21
New developments in human computer interaction.....	21
Intel announces mobile developments .....	22
AMD developments .....	22
New classification of ICT users .....	23
New examination security measures.....	23
DisplayPort developments.....	23
JISC study into identity management.....	24
Green computing news .....	24

<b>Software and internet</b> .....	25
<b>Analysis: service oriented architecture</b> .....	25
<b>Software and internet news</b> .....	28
XP no longer to be sold on PCs from 2008 .....	28
Open source in the public sector .....	29
Windows Server update .....	29
Apple announce Safari for Windows .....	29
New social software research .....	29
Internet safety and security .....	30
Mobile web changes.....	30
Public sector online services survey.....	31
Simple programming and development tools .....	31
Language tools and programming interface added to Google.....	31
<b>TechNews Information</b> .....	33
Disclaimer .....	33
Copyright and permitted use .....	33
To unsubscribe.....	33
Feedback: .....	33

## Networking and wireless

### Analysis: Intrusion detection and prevention systems

As schools increasingly rely on effective and robust ICT for delivery of key services, the security and stability of systems is crucial. This article focuses on one aspect of network security – how intrusion detection and prevention systems fit into network design.

Securing an individual computer system or network of any scale relies on a whole set of different tools. The most common types are access control, anti-virus protection, firewalls and intrusion detection and prevention. Access control is about having robust systems for authentication and authorisation of access to resources; for example, a password or smartcard system. Anti-virus software prevents malicious software from being run on a computer. Firewalls allow or deny the transit of data based on rules related to a network port or application. These are all effective measures, but are commonly based on crude binary rules (allow all/deny all) applied to settings (such as permitted ports) or libraries of information that can go out of date quickly (anti-virus). Additionally, some personal access control information can be compromised through social engineering.

Intrusion detection and prevention systems add an extra layer of security. By analysing in more detail the nature of traffic passing across the network they can prevent unwanted applications or network traffic. Intrusion detection systems (IDS) are the basic implementation and intrusion prevention systems (IPS) build on this (thus an IPS includes an IDS). For example, where a firewall would either allow or deny traffic based on the destination network port; an intrusion detection and prevention system might look at whether data being sent through an allowed port

was suitably structured. This might prevent legitimate ports, such as those used by web servers, being used for other purposes. Controlling traffic to only legitimate uses can minimise the impact of some self-propagating viruses and control often costly bandwidth use. Updates for IPS/IDS are usually published more quickly than operating system updates, so can offer protection in the time between new threats appearing and patches being issued and installed.

As the name suggests, intrusion detection systems are concerned with identifying where unwelcome behaviour has occurred in the network. This could be accomplished either through an in-line monitoring system that examined traffic in real-time, or by analysing log files that have been collected. Intrusion detection and prevention systems will work in one of four ways. These are network-based, protocol-based, application-based and host-based.

Examining data flowing across the network rather than collecting it from a destination computer is known as network-based intrusion detection. Protocol-based detection examines in detail particular traffic. For example, for a web server this might be examining HTTP and HTTPS traffic in detail to ensure requests are well-formed and not attempting to execute malicious instructions. Application-based systems take this a stage further and look in detail at how applications format requests using protocols. For example, a particular database application might format SQL server calls in a particular style. An application-based system could recognise this format and block any requests not of this style. Collecting and analysing data using log and system files of a particular server is known as host-based intrusion detection.

Typically an intrusion detection system will warn an administrator in real time that an attack is suspected, but it will not attempt to prevent the attack taking place. Intrusion prevention systems take the information from detection systems and apply it in order to actively counter the threat. For example, a detected threat originating from a particular IP address could cause an intrusion prevention system to instruct a compatible firewall to block all traffic from that address.

Intrusion detection is particularly relevant to wireless systems. Older systems, such as Wired Equivalent Privacy (WEP) are recognised as being weak, and whilst stronger alternatives are available, the work of hackers to find and exploit other flaws is unlikely to stop. Intrusion prevention systems have a place in this environment in monitoring networks and alerting administrators when unauthorised access to the network takes place. The main role of IDS/IPS in a wireless environment is to detect and prevent connection from rogue devices and to check for denial of service attacks where wireless networks are flooded with data. Some of these functions can be replicated by manual inspection.

Implementation of these systems can either be in hardware or software. Hardware might be dedicated appliance units or modules for routers. Hardware systems do offer higher performance than software, but this is reflected in cost. Wireless systems always require additional hardware. Many firewall developers are looking at implementing Deep Packet Inspection (DPI) into their firewall systems. DPI analyses each packet that passes across a firewall and can determine the type of traffic. In

addition to allowing system administrators to block all data of a particular type, it can also take on the IDS/IPS role and block unwelcome traffic. Convergence between these applications will be attractive to administrators seeking to simplify their networks.

The increasing sophistication of manual or machine-based automated attacks means that system administrators could consider the role of intrusion detection and prevention systems. However the implementation of any system, whether hardware, or software based, is unlikely to be cheap. Therefore, it is essential that while managers take security seriously, any investment is proportional to the actual risk. It may be that, for a school connected to a local authority network, a well-maintained anti-virus and firewall system will reduce the risk to a sensible level without further expense.

Intrusion detection and prevention is not an exact science. Systems that look for patterns of activity run the risk of generating false positives when new users or applications are introduced. Signature-based systems suffer a lag, similar to anti-virus software, between a new threat being identified and updates being developed, tested and installed. This may be partly mitigated by the use of algorithms that can identify rogue traffic based on similarity to known threats or behaviour.

A network with security as a priority will have a number of different devices and systems in place. In addition to protecting users these will likely impact on the performance by introducing lag (delays) and jitter (variation in the delay). So, for example, if performance is the primary consideration then security may need to be traded off. IDS/IPS are part of the possible security picture, but should not be seen as a replacement for more mature systems such as traditional firewalls, anti-virus, anti-spyware, proxy servers, strong password policy, network address translation and a solid backup regime. As with all network infrastructures, systems must be sized appropriately for the characteristics of the network. For example a device that is suitable for a small primary school network may lack the performance necessary to cope with the network traffic of a secondary school.

The Becta technical specification: institutional infrastructure lays out some guidance on these systems. It includes a section of guidance on the role of IDS with wireless and states that 'Institutions should employ regular intrusion detection checks' (although this can be done manually and doesn't imply dedicated systems are needed.)

[http://industry.becta.org.uk/content\\_files/industry/resources/Specification\\_key\\_docs/techspec\\_institutional\\_infrastructure\\_versionC\\_final.pdf](http://industry.becta.org.uk/content_files/industry/resources/Specification_key_docs/techspec_institutional_infrastructure_versionC_final.pdf)

Finally, it is a sobering truth that the weakest element in an integrated security policy is the human one. Social engineering can be used to get users to reveal their passwords and virus infections are probably more commonly introduced through portable USB memory sticks or unauthorised downloads than via managed and protected e-mail services.

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## Networking and wireless news

### IP addresses running out

The American Registry for Internet Numbers (ARIN), the body who controls the allocation of IP addresses in North America, has warned that only 19 per cent of the total IPv4 address space is still available. This is unlikely to satisfy growing demands and the pool is expected to run out by 2010, due to a combination of use and fraudulent registrations eating up large blocks. They call for networks to be upgraded to IPv6. Despite such gloomy predictions, few ISPs and organisations have rolled out this new standard due to the cost and the fact that work-arounds, such as network address translation (NAT), have proved adequate until now. IPv6 offers a massive capacity increase – giving the equivalent of  $5 \times 10^{28}$  addresses per head of population as compared to the  $4 \times 10^9$  of IPv4 (79 228 162 514 264 337 593 543 950 336 compared to 4 294 967 296)

Internet Protocol (IP) is the fundamental communication protocol used in data transfer across the internet and local area networks. IP works at Layer 3 of the OSI Model for networks

[[http://searchnetworking.techtarget.com/sDefinition/0,,sid7\\_gci523729,00.html](http://searchnetworking.techtarget.com/sDefinition/0,,sid7_gci523729,00.html)]. The role of IP is to dictate the format and structure of the data packets that travel across the network. The current most widely used variation of IP is IPv4. This is based on a standard first published in 1981, but has a number of limitations which are becoming more and more obvious to network engineers and in some cases users. The internet is based on a backbone of IP routers and ISPs that maintain addressing and routing links between each other to deliver data traffic.

The US federal government has mandated a move to IPv6 by 2008 for its systems, which should drive adoption. It has estimated the cost of this change at between \$25 and \$75 billion, which gives an idea of the scale of cost in upgrading virtually every piece of network equipment on the LAN and the WAN.

<http://arstechnica.com/news.ars/post/20070521-arin-its-time-to-migrate-to-ipv6.html>  
<http://www.arin.net/v6/v6-resolution.html>

For more information on IPv6 see TechNews Analysis March 2006.

[http://partners.becta.org.uk/page\\_documents/research/technews/mar06.pdf](http://partners.becta.org.uk/page_documents/research/technews/mar06.pdf)

### MIT demonstrate wireless power

MIT researchers have demonstrated wireless power, by powering a light bulb from a remote energy source. The technology, known as 'WiTricity' could be used to provide power wirelessly to a variety of electronic devices up to 5 metres away. The technology uses the concept of resonance by using vibrations caused by certain frequencies of electromagnetic radiation. By using two magnetically coupled coils of the same resonant frequency power can be transferred.

<http://web.mit.edu/newsoffice/2007/wireless-0607.html>

### Wi-Fi certification update

The Wi-Fi community is gearing up for the release later this summer of the latest 802.11 equipment certified by the Wi-Fi Alliance. Pre 802.11n hardware is being tested based on draft 2.0 of the standard. Final ratification of 802.11n isn't expected

until late 2008 at the earliest, but equipment based on early drafts is already being sold by many manufacturers. This certification programme is intended to ensure these products are interoperable. Interoperability, even at this draft stage, is intended to give consumers the confidence to purchase now. Manufacturers are hoping that any updates required to meet the final standard can be delivered through firmware upgrades, although there is no guarantee of this.

In addition to compatibility testing, the Wi-Fi Alliance (WFA) industry group has launched a logo scheme to clearly communicate compatibility between different versions of 802.11 hardware.

[http://www.wi-fi.org/pressroom\\_overview.php?newsid=545](http://www.wi-fi.org/pressroom_overview.php?newsid=545)

802.11n is the latest iteration for wireless LANs and intends to deliver up to 540Mbps (200Mbps in practice) over a longer range than current 802.11b and g systems. It works in both the 2.4GHz and 5GHz spectrum but better performance will be achieved in the 5GHz spectrum through the use of channel bonding. Institutions are advised to wait for the fully ratified 802.11n standard before implementing it. See Becta's Technical Specification Institutional Infrastructure for more advice on implementing Wi-Fi.

In other wireless news, Nokia has passed on responsibility for Wibree technology to the Bluetooth Special Interest Group. Wibree is an ultra-low power short range technology, similar to Bluetooth, but with even lower power consumption. By sharing the development with a wider group the company hopes progress and adoption will be speeded up.

[http://www.cbronline.com/article\\_news.asp?guid=7B35F15F-BCA1-41C0-8466-C67BDD918E23](http://www.cbronline.com/article_news.asp?guid=7B35F15F-BCA1-41C0-8466-C67BDD918E23)

### **Developments in WLAN architectures**

Despite the focus of the majority of wireless vendors on pushing boundaries of performance and speed there are still underlying architectural issues that affect all WLANs. The earliest Wi-Fi networks used so-called 'fat' access points that were self-contained units, handling all activities including access control and any traffic management. Over time, as enterprise interest rose and security issues became better understood, this model changed. A modern wireless network often uses quite 'dumb' access points and then backhauls data to a dedicated unit which links to authentication and management information. This model, combined with high speed wired backhaul, is effective in most circumstances, though has not yet been proven to be optimal for upcoming high bandwidth solutions (802.11n). In fact, some analysts suggest that 802.11n may cause a move back towards 'fatter' access points.

There are now several new approaches to WLAN architecture, including suppliers who use a single channel for adjacent access points (Meru, Extricom), and Xirrus who offer centralised access points that beam their signals to where coverage is needed. Recent announcements include:

An upgrade for Aruba access points removes the need for a wired backhaul by converting units into wireless bridges. This effectively creates a short range mesh network. Such networks can be flexibly deployed and removed to serve temporary

classrooms and offices that would otherwise be expensive to cable. This might also be effective in older buildings where installation works are difficult and typical equipment range is short due to solid walls.

<http://www.techworld.com/networking/news/index.cfm?NewsID=8774&email>

Aerohive is promoting new 'fat' access points that meet modern application requirements. They claim to offer the same security and central management provision, but with enhanced networking features to improve data transfer performance. These access points are able to calculate the optimum route for network data to avoid latency. This is important for time-critical applications such as Voice-over-IP and should offer better performance than the current common configurations, especially on busy networks.

[http://www.cbronline.com/article\\_news.asp?guid=31CE9CCF-EFA4-4E21-A15F-833B7C5C112D](http://www.cbronline.com/article_news.asp?guid=31CE9CCF-EFA4-4E21-A15F-833B7C5C112D)

### **WiMAX update**

WiMAX, an emerging wireless broadband technology, comes in two varieties: fixed and mobile. Fixed WiMAX was agreed as IEEE 802.16-2004 and Mobile WiMAX as IEEE 802.16e-2005. It is expected that initially the real-world speeds of WiMAX will be around 10Mbps at a range of 10km. A faster version of WiMAX, 802.16m, is expected in 2009.

US telecommunications regulators have formally approved the first WiMAX card, produced by the wireless broadband ISP Clearwire. This shows how close all manufacturers are to delivering standards based services after a period of pre-certification equipment being used. Mass market adoption is expected to be significantly supported by Intel's plans to include Mobile WiMAX on its Montevina platform, due out some time in the first half of 2008.

<http://www.techworld.com/mobility/news/index.cfm?newsID=8729&pagtype=samechan>

Interoperability is traditionally achieved through a formal certification process, but recently vendors met in France for a more informal compatibility testing session or 'plugfest'. This included testing of handover between basestations and experiments with new antenna configurations designed to increase performance. Many vendors are waiting for the next stage in the certification programme, referred to as Wave 2, which adds more sophisticated features. An additional delay has been introduced by Ofcom, who has postponed its auction for 2.5 GHz spectrum, suitable for WiMAX, until next year.

<http://arstechnica.com/news.ars/post/20070518-plugfest-in-france-nudges-mobile-wimax-spec-forward.html>

### **European 4G tests**

European mobile operators have announced they are to collaborate to test a possible technology for next-generation (4G) mobile data. It is likely that Mobile WiMAX (see above for more information) and/or Cellular LTE (Long-Term Evolution) will be the major technology standards used in 4G. In Japan NTT DoCoMo has

demonstrated '4G' technology delivering 1Gbps download speeds to a device moving at 20kph.

<http://www.nttdocomo.com/pr/2005/000672.html>

The European collaboration will use new antenna technology and very spectrum-efficient systems to deliver peak rates of 100Mbps. T-Mobile International, Orange and Vodafone have joined forces with vendors Alcatel-Lucent, Nokia Siemens Networks, Nortel Networks and Ericsson to test the technology.

<http://www.techworld.com/mobility/news/index.cfm?newsID=8754&pagetype=samechan>

It is still unclear which of proposed '4G' standards will dominate, but the first production devices are not expected before 2009 at the earliest. Mobile WiMAX is a new technology while Cellular LTE, also called 3GPP Long Term Evolution, is an enhanced version of the popular Universal Mobile Telecommunications System (UMTS) 3G standard.

It is possible that both these technologies will have a place in the next generation solutions. The International Telecommunications Union (ITU) is referring to these services as 'IMT-Advanced' and expects to see them coming to market from 2011. The WiMAX Forum and the IEEE have submitted proposals for WiMAX to become part of ITU standards, which would strengthen its position for 4G and allow WiMAX to make use of frequencies reserved for 3G expansion.

### **Community wireless in St Helens**

The challenge of delivering ICT services in a controlled fashion to disadvantaged homes has led to an innovative project in St Helens. The project is a collaboration between partners such as the University of Liverpool and St Cuthbert's Catholic Community College of Business and Enterprise. It uses wireless links from the school to connect to thin client systems in homes. The system hopes to provide parents and other users with school and community information online.

Although Thin Clients won't work should the network fail and suffer when the quality of connection drops, the units themselves are reliable, relatively cheap, easy to manage and unattractive to thieves.

<http://www.computing.co.uk/computing/news/2190068/wireless-connect-st-helens>

### **Ofcom news**

Ofcom has announced that it is investigating the allocation of further licence-exempt spectrum. This is the type of spectrum that does not require a licence to operate equipment, such as the 2.4GHz spectrum used by Bluetooth and 802.11b/g Wireless LAN. The use of the 2.4GHz spectrum has revolutionised wireless communications and this would not have happened so effectively, if at all, if all use required a licence. The consultation looks at how spectrum use might be regulated, even if not licensed, in order to give controlled flexibility to wireless vendors and users. It also sets out further possible licence exempt sections of spectrum that might be used in the future, such as over 105 GHz. Spectrum use is commonly harmonised internationally (within the EU and wider), but Ofcom highlights how this may be a barrier to innovative applications.

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

Additionally Ofcom has further strengthened its role in monitoring the growing Local loop unbundling (LLU) market. LLU, where providers other than BT operate broadband services to consumers, has led to a range of new entrants to the broadband market and driven market growth. Ofcom has announced that consumer protection previously introduced to regulate the mis-selling of voice lines will be extended to broadband services. Both LLU and fixed-line voice sellers are required to establish and comply with a code of practice for sales and marketing.

[http://www.ofcom.org.uk/media/news/2007/05/nr\\_20070521a](http://www.ofcom.org.uk/media/news/2007/05/nr_20070521a)

### **EU satellite positioning system issues**

Begun in 2003, Galileo is a European initiative that will use modern technology to deliver a highly accurate satellite global positioning system. The full system was expected to cost £2.3bn and be operational in 2010. The service was designed to provide a more accurate, civilian controlled alternative to the US government GPS system. It should provide accuracy up to a metre even in urban areas. However, the project has recently stalled. The EU is expected to inject more public money to keep the project alive after problems within the private sector consortium that had been expected to fund and operate the project. So far only one of the 30 planned satellites has been successfully launched. The proposal presented to the EU, expected to be ratified by Ministers, includes full deployment five years later than planned – by the end of 2012 and an additional €1bn (to a total of €3.4bn) from public funds. The private sector is still expected to control operation of the system once it has been deployed.

[http://www.economist.com/agenda/displaystory.cfm?story\\_id=9214968](http://www.economist.com/agenda/displaystory.cfm?story_id=9214968)

### **GPS on a SIM**

Ubiquitous, low cost, location based computing (see Mobile location-based technologies – TechNews March 2007) has moved a step closer with the announcement that a French company has developed a GPS unit that fits in the SIM slot on a mobile phone. A growing number of smartphones and PDAs offer GPS services, but these are often premium items. A mass produced, low cost technology like this could turn relatively simple devices into full positioning systems. The company, BlueSky Positioning, hopes to have production samples by summer 2007, though wide adoption is likely to take time. This solution uses Assisted (A-GPS) to improve battery life. A-GPS uses both the device and an external server to determine location and provide information rather than be totally self-contained.

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

### **Multimedia**

#### **Analysis: recording lessons**

Audio and video equipment can now deliver high quality recordings simply and inexpensively. Schools and colleges are developing a range of services around this technology in support of teaching and learning for students and staff. This article looks at some of the issues, applications and technologies around the collection, use and distribution of recordings of lessons

There are a number of different possible types of recording. The most basic is to simply record sound via one or more microphones. These might be fixed in place in a room or mobile with a teacher, depending on the reason for the observation. Capturing audio can be done directly to a computer or to an intermediate device such as a digital voice recorder for later upload. The next stage is to include some kind of camera to capture both audio and video. Finally, for more formal lectures, or when specifically creating material for distribution, it is possible to create a package complementing audio and video with a synchronised presentation or computer screen recording.

Recorded lessons can be used to support inclusion for children who have missed lessons through illness or other absence. A library of lessons, correctly organised, might also help learners review and reflect on lessons in more depth. Some content is naturally suited for this format, such as science experiments that are difficult to replicate by a student at home.

Where large numbers of lessons are recorded there is a significant task in organising and cataloguing material. The National Curriculum does help this by breaking down subjects into components, but lessons that are kept, still need to be manually edited and tagged with metadata. Systems such as Apreso (<http://www.apreso.com/>) can automate the capture and web publication of lesson recordings. Apreso can be used by students to access the same material in different formats, for PCs and mobile devices for example. Transcriptions generated using voice recognition technology is another service that can be used with recorded lessons and lectures, perhaps to support accessibility. Saint Mary's University in Nova Scotia, Canada has been using the IBM ViaScribe voice recognition product as part of inclusion projects. <http://www.liberatedlearning.com/technology/index.shtml>

Transcriptions synchronised with the audio/video allow content to be easily searched. There are commercial technologies that use automatic transcription and allow video and audio searching. For example, Blinkx is a search engine that uses speech recognition to transcribe online video and then allow text-based searching of the audio. <http://www.blinkx.com/>

Marvel is an IBM project that is also designed to machine read audio and video content for later retrieval. The BBC has announced it is to work with IBM on developing the technology to better allow its content to be navigated using free text terms such as searching for all video showing 'two men, dog, hill, clouds'. <http://mp7.watson.ibm.com/marvel/>  
<http://networks.silicon.com/webwatch/0,39024667,39166201,00.htm>

A number of different applications are made possible by recording or otherwise remotely viewing lessons. Lesson observation by senior teachers, researchers, inspectors or trainees can be used for example, as an alternative to using one-way mirrors installed in classrooms. This can be used to support teachers, to provide an extra pair of eyes, to help with discipline or to help train new teachers. Schools have

also experimented with using ICT to provide live feedback to a teacher during a lesson using a Bluetooth headset.

<http://www.tes.co.uk/2382994>

Use of technology in these ways has not met with unconditional approval. In 2006 concerns were raised at the NASUWT conference that CCTV observation was being used as 'management bullying' by some senior managers.

<http://www.tes.co.uk/2216214>

Teachers have also expressed unhappiness with mobile phone videos of their teaching, as filmed by pupils, being distributed online.

<http://news.bbc.co.uk/1/hi/education/6522501.stm>

The TDA ran a series of projects to deliver Initial Teacher Training (ITT) using video technologies. An example project can be seen at

<http://www.tda.gov.uk/partners/quality/partnership/trainingschools/casestudies/newington.aspx>. A project in Coventry used video conferencing and lesson recording

through H.323 compatible equipment and the JANET Video Conferencing Service to allow trainees to observe and lessons from two Higher Education Institutions (HEIs) in the region without having to travel. This shared experience promoted discussion after the lesson was watched.

Capture and storage presents a technical issue. A number of universities have made lectures available using Apples iTunes. This is an extension of the podcasting/vodcasting concept that has been covered in more detail in TechNews November 2005. The related area of on demand video was covered in TechNews April 2007. Others distribute recordings as podcasts/vodcasts on their websites or learning platforms. If being made publically available there are issues around internet safety, privacy and consent.

[http://partners.becta.org.uk/page\\_documents/research/technews/nov05.pdf](http://partners.becta.org.uk/page_documents/research/technews/nov05.pdf)

<http://www.yale.edu/opa/podcast/>

[http://partners.becta.org.uk/page\\_documents/research/technews/apr07.pdf#multimedia](http://partners.becta.org.uk/page_documents/research/technews/apr07.pdf#multimedia)

Lessons and lectures can also represent valuable commercial property to universities and even schools.

The University of Western Australia has developed a software system called Lectopia that is designed to capture, process, deliver and monitor lecture content for a variety of different client devices. This is a formalised approach to lecture content management and is used by Duke University.

<http://ilectures.uwa.edu.au/>

Lectopia is an example of a specialist, dedicated solution to lecture capture and delivery. As well as supporting the capture and storage of content it also manages and logs the distribution and viewing to give usage statistics. Similar systems are used in computer based training scenarios.

The technology used for the capture can vary. Rooms can be designed with these systems in mind. For example the Classwatch system (<http://www.classwatch.co.uk/>)

suggests that cameras and microphones can be embedded discretely in the ceiling to allow observation and management with minimum intrusion and disruption. A common alternative is to use either standard digital video cameras or video conferencing equipment. The WMnet guide to video conferencing at <http://www.wmnet.org.uk/vc/introVCsite/pges/settingup.htm> includes tools to help analyse how cameras and microphones might work in different classroom sizes.

Use of CCTV and similar technologies is covered by the Data Protection Act 1998 which sets out a number of regulatory requirements designed to protect the transfer of information within and between organisations. This includes the processing of images of individuals caught on CCTV cameras. All CCTV systems that process data must be notified to the Information Commissioner. <http://www.ico.gov.uk/>

Recording can be a sensitive issue and some teachers, parents and pupils may object to its use. So consultation is important. Before installing systems schools are advised to set clear policies on when and where equipment will be used, who has access to the content and how it will be used. For creating learning materials, lesson capture could sensibly focus just on the teacher to mitigate the risk to pupils. However, this assumes a traditional style of lesson delivery that might not always be appropriate. Therefore it is likely that this technology will be used more for elements of lessons, such as experiments/demonstrations and lecture style presentations.

## **Multimedia news**

### **BBC and ITV join up to offer digital satellite**

Broadcasters and government have based plans for more consumer choice and higher quality television signals on the plans to move the country from analogue to digital television. By 2012 all analogue TV signals will have been switched off.

The majority of the country is expected to be able to benefit from the Freeview digital terrestrial system, after switch off. However, while this will offer more channels and a clearer picture, it does not currently have the capacity for many HD channels. These services are now only available via digital cable and satellite. BBC and ITV have announced plans to launch a free digital satellite service, similar in concept to Sky's Freesat service, in 2008. This service, also called Freesat, is expected to support the small number users who are outside Freeview areas, as well as providing space for new channels and HD content.

<http://www.astra2d.com/freesat.htm>

<http://www.digitaluk.co.uk/>

### **New tools for mediascape development**

HP has for some time been a key player in the development of mediascapes. These are location-based arrangements that overlay the physical world with context related digital data. Using location-aware technology handheld devices, users are invited to explore how real and virtual worlds can interact. Basic examples would provide information on paintings in a gallery when a visitor was located in front of them and more ambitious projects can transform school playing fields into the African plains.

<http://www.futurelab.org.uk/projects/savannah/>

HP mscapers.com has been updated with new tools, demos and tutorials in building mediascapes. This context was covered in the article Mobile location-based technologies (TechNews March 2007). Using the content of this site and easily-obtainable GPS systems it is straightforward to start developing and distributing location-based experiences.

<http://www.mscapers.com/msin/ABA0000029>

<http://www.mscapers.com/tags/demo>

### **BBC iPlayer approved**

The BBC, after gaining approval from the BBC Trust, has announced it will be launching its iPlayer service in 2007. The iPlayer is designed to allow users, on Windows PCs initially, but with other versions to follow, to download and watch BBC TV programmes. Not all programmes will be perpetually available, but it is expected that in addition to live streams, at least seven days of programming will be available for recall. Eventually the iPlayer is intended to be made available for Freeview set-top boxes.

<http://news.bbc.co.uk/1/hi/entertainment/6607083.stm>

ITV has also announced that it is launching its own broadband-delivered TV service, including a 30 day catch up facility.

<http://www.itv.com/page.asp?partid=7785>

### **Visions of a mobile TV future**

Analysts GfK have been talking up the benefits of convergence in the mobile computing market. They are predicting perhaps a 20 per cent decline in the size of the PDA market in 2007 as smartphones become increasingly the focus of consumer and corporate interest. Convergence of phone, PDA, media player and camera has been discussed for some time, but it seems that the smartphone is finally delivering on this promise.

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

[http://techdigest.tv/2007/05/smartphones\\_goi.html#more](http://techdigest.tv/2007/05/smartphones_goi.html#more)

Mobile TV has been suggested by some as the next 'killer app' for mobile phones. Analysts are split on opinions of the market. Canalys played down the level of consumer interest, suggesting that in the majority of Europe, GPS is much more enticing than Mobile TV. Investigations by Screen Digest reported a different story – at least in Japan, Korea and Italy. In these nations millions of consumers are enjoying a choice of channels and are not put off by the relatively small screens on devices. Services are funded on a subscription rather than advertising model.

Although TV is offered over 3G networks in the UK, this is not a solution suitable for widespread take-up. The use of radio spectrum to broadcast TV to mobiles has been tested in small-scale trials in the UK. Wider deployment may have to wait for further spectrum release around 2012 suitable for the DVB-H (Digital Video Broadcasting-Handheld) technology. Digital Multimedia Broadcasting (DMB) was trialled in the UK in 2006 and the BT Movio platform is being used by Virgin Mobile to deliver content. Movio uses Digital Audio Broadcasting (DAB) which is the basis for DMB.

### **High capacity colour barcodes**

A colour 2-dimensional barcode system developed by Microsoft has been adopted by the International Standard Audiovisual Number International Agency (ISAN-IA) agency for marking audiovisual materials. The ISAN is equivalent to the ISBN of a printed work. Microsoft calls this the High Capacity Colour Barcode (HCCB). Barcodes have evolved from simple line patterns (designed to be read in one dimension) through black and white patterns such as those used to link to online resources via cameraphones, to these four and eight colour systems that can hold up to 3500 characters of data. They could have a range of educational uses from linking to resources to allowing digital interaction with objects in the real world.

Barcodes face an ongoing challenge from RFID systems that can potentially store a large amount of data. Radio Frequency Identification (RFID) chips are small tags that contain information that respond wirelessly when scanned. The information they store is increasingly used for wireless reading of passports, parcel tracking and stock control. They can store a lot of information compared to normal barcodes, such as unique identifiers and can be read wirelessly.

<http://digital50.com/news/items/PR/2007/04/16/SFM039/international-organization-licenses-microsofts-new-multicolor-bar-code-technology-fo.html>

### **Displays and electronic paper updates**

Despite products designed to replace books, such as the Sony PRS-500 Reader and the science fiction promise of self-updating newspapers, the main application for modern thin, flexible, energy-efficient displays has been handheld devices.

<http://www.learningcenter.sony.us/assets/itpd/reader/>

A number of developments have been recently made public in this area of display technology. The focus is on paper-like properties – thin, light, non-volatile and easily readable without a backlight.

E Ink has announced a new faster and brighter black and white display technology, now known as Vizplex. It is able to show 8 levels of grey and is available in a range of sizes – 1.9in, 5in, 6in, 8in and 9.7in. The original was only 6 inches and showed 4 levels of grey. E Ink uses liquid filled microcapsules containing black and white chips that change position when a charge is applied. This is called an electrophoretic display.

[http://www.eink.com/products/matrix/imaging\\_film.html](http://www.eink.com/products/matrix/imaging_film.html)

Organic LED technology (OLED) has not come to dominate the display market as quickly as some analysts suggested. However, manufacturers such as Samsung and LG. Philips are still confident products will emerge and the markets grow. Both companies have announced new active-matrix OLED (AMOLED) displays. These are thin and flexible and offer resolutions of 320x240 pixels with millions of colours. These small (2.2" and 4" respectively) displays are expected to be used in smartphones. The flexibility means that displays may be rollable rather than fixed and flat. OLED displays do not require backlighting which will increase the battery life of models.

<http://arstechnica.com/news.ars/post/20070517-samsung-and-lg-philips-announce-super-thin-oleds.html>

Additionally LG.Philips has demonstrated the prototype of a flexible 14.1" colour e-paper display. It is not clear when this will be available commercially.

[http://www.reghardware.co.uk/2007/05/14/lg\\_philips\\_shows\\_bendy\\_colour\\_lcd/](http://www.reghardware.co.uk/2007/05/14/lg_philips_shows_bendy_colour_lcd/)

Swedish researchers have announced an interactive display board that includes touch sensitive technology and printed speakers. This would enable audio data to be embedded in different sections of a board to give users further information on demand.

<http://news.bbc.co.uk/1/hi/technology/6723475.stm>

### **Mobile projector developments**

New green laser products from manufacturer Corning have been announced for portable projectors and related technologies. Developments in projector technology have promised tiny units built into mobile phones and portable media players for some time. Products themselves have been hampered by technological limitations in light sources and power requirements. The requirement for a component in a smart phone or media player is likely to be 1W or less. Additionally sourcing three colour (red, green and blue) light sources is troublesome. Miniature lasers are considered a good solution, but green lasers have been notoriously difficult to deliver.

Analysts comment there are two barriers to the widespread adoption of this technology. First the barriers to production and secondly it is not clear what the value is to users.

[http://news.com.com/Will+green+mean+go+for+mobile+projectors/2100-1008\\_3-6186828.html?part=rss&tag=2547-1\\_3-0-5&subj=news](http://news.com.com/Will+green+mean+go+for+mobile+projectors/2100-1008_3-6186828.html?part=rss&tag=2547-1_3-0-5&subj=news)

For more information on Projector Technologies see TechNews April 2007

[http://partners.becta.org.uk/page\\_documents/research/technews/apr07.pdf#hardware](http://partners.becta.org.uk/page_documents/research/technews/apr07.pdf#hardware)

### **Mobile phone futures**

The mobile phone market continues to grow massively with more and more emphasis on high cost smartphones such as Apple's forthcoming multimedia iPhone. Analysts at Dresdner Kleinwort Investment Bank (DKIB) have recently suggested that Nokia is still making relatively small amounts of income on these high end devices and instead rely on low-cost handsets, perhaps used with anonymous pay-as-you-go accounts.

[http://www.theregister.co.uk/2007/06/05/nokia\\_budget\\_growth\\_reliance/](http://www.theregister.co.uk/2007/06/05/nokia_budget_growth_reliance/)

The iPhone has been scheduled for launch in June (in the US) after a focus on development that pushed the release of the next version of Mac OS X to later in the year. Apple have however released new MacBook Pros with updated processors and the 15" models have new LED-based screens that provide better performance for lower power consumption.

[http://www.apple.com/uk/pr/050607\\_mbp.html](http://www.apple.com/uk/pr/050607_mbp.html)

Students at the University of Dundee have developed a novel spin on the mobile phone. The young product designers have invented a range of devices that use mobile phone technology in innovative ways. Rather than being focussed on speech or text messaging, these devices interact with each other in different ways. For

example one is designed to vibrate when it receives text messages to allow friends to pass messages remotely.

<http://www.idl.dundee.ac.uk/phonenotphone/products.php>

### **Text messages and literacy**

The chief examiner of the Department of Education in the Republic of Ireland has expressed concern that the growth in text messaging is damaging standards of literacy. The examiner is quoted as saying mobiles present 'a significant threat to writing standards in English' and 'text messaging and email in particular would appear to have affected spelling and punctuation'.

<http://www.ireland.com/newspaper/frontpage/2007/0425/1177280209792.html>

This contrasts with reports earlier this year from New Zealand. The New Zealand Qualifications Authority (NZQA) announced that in general examinations the use of txt spk (text speak) and abbreviations will not be automatically marked down. The authority has said that in subjects where language and grammar are not being specifically assessed says credit will be given if the answer 'clearly shows the required understanding', even if it contains text speak.

<http://www.stuff.co.nz/stuff/0,2106,3854612a11,00.html>

### **Next generation DVD news**

The next generation DVD wars continue. The Sony/Philips proposal is called Blu-ray Disc (BD). Each layer on a BD stores 23.5, 25 or 27GB of data. The specification supports multiple layers and a 100GB prototype has been announced by TDK. Originally BD required a caddy or cartridge, but this has been changed to a hardened coating to address consumer expectations of discs that look like traditional CDs and DVDs. BD claims a higher data transfer rate than HD-DVD for movie applications (1.5x vs 1x). (<http://www.blu-ray.com/>). HD DVD (High Density Digital Versatile Disc) is the Toshiba backed proposal. It is available in 15GB (single layer), 30GB (double layer) and 45GB (triple layer) versions. HD DVD is designed in a similar way to DVDs and shares significant parts of the manufacturing process. This is the major advantage of this format and will allow easy adoption of volume production. (<http://www.hddvdprg.com/>)

The battle for consumers has been focussed around the price of players and next-generation games consoles. The Sony PlayStation 3 includes a Blu-ray drive and Microsoft's Xbox 360 can be supplemented with an add-on HD-DVD drive. Until recently the cheapest Blu-ray drive was a PlayStation 3, but a recent price cut from Sony means a standalone player can be purchased for around \$499. This is still more expensive than a typical HD-DVD player, but is already half the price of launch models.

[http://www.reghardware.co.uk/2007/06/05/sony\\_cuts\\_price\\_of\\_blu-ray\\_player/](http://www.reghardware.co.uk/2007/06/05/sony_cuts_price_of_blu-ray_player/)

There is still no clear winner in this battle of the formats, but despite the higher cost, many commentators are expecting Blu-Ray to dominate, either as standalone devices or in dual-format players. Forrester in particular suggests that Blu-ray's position as more than just 'a one-trick pony for video playback' will ensure its ultimate victory. HD-DVD, despite backing from big names like Microsoft, has lost significant ground in terms of sales and is also perceived as a playback mechanism while Blu-Ray writeable drives for PCs are widely available, if expensive. HD-DVD rewritable drives are becoming available, but these are not widespread. Blockbuster,

the movie rental business, has decided to focus solely on Blu-Ray in many of its stores due to the fact that more movies are released in that format.

[http://news.com.com/Forrester+Blu-ray+winning+drawn-out+format+war/2100-1041\\_3-5902753.html](http://news.com.com/Forrester+Blu-ray+winning+drawn-out+format+war/2100-1041_3-5902753.html)

## Hardware

### Analysis: 3D printing

This article will look at the latest developments in rapid prototyping technologies currently marketed as 3D Printing. It will draw the distinction between the relatively low cost newer technologies aimed at small businesses and education, with existing commercial technologies that work on similar basic principles.

#### *Rapid prototyping*

Rapid prototyping refers to the creation of prototype models, or mock-ups at relatively low cost without the need for special tooling. Rapid prototyping has been around for over twenty years, offering a direct transfer from 3D plans and virtual models developed in Computer Aided Design (CAD) software tools, to a physical prototype model and sometimes even the finished product.

CAD/CAM forms part of the Keystage 3 and 4 curriculum for design and technology. However, most existing advice from places such as Teachers TV or CAD/CAM in schools stops short of rapid prototyping. Previous CAD/CAM advice, such as the joint DfES and Warwick University publication, focused on 2D cutting and engraving or 3D milling and routing ie cutting out shapes or grinding away blocks. This method is limited in the types of product shape that can be modelled. This report is now four years old and rapid prototyping systems have shrunk in size and price since then. With the advent of affordable rapid fabrication, it is possible to go from design to build in a single step, speeding up the process and producing higher quality end results. It also allows pupils to see their efforts realised in the same manner as they would in industry.

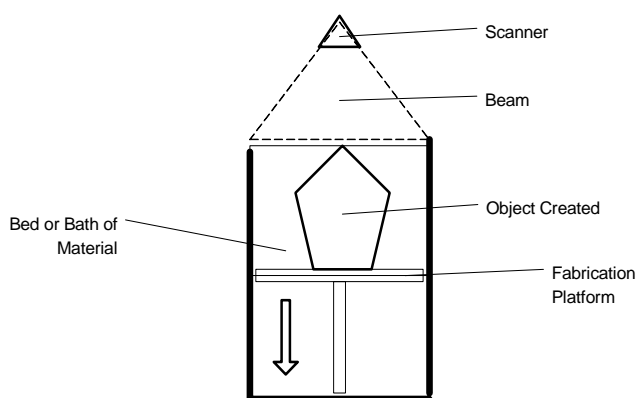
<http://www.cadinschools.org/>

<http://www.teacherstv.co.uk>

<http://www.cadinschools.org/pdfs/CAM%20Equipment%20Spec%20&%20Rec.pdf>

Nearly all current rapid prototyping units create models using additive techniques, whereby successive layers of material are built up to form the shape described in the computer model. In some cases, and depending on the shape being created, a supporting structure is required for the prototype to be built upon. These supporting structures can also be created using the rapid prototyping equipment. In these cases the supporting structure is created using a material that has a lower melting point than the finished material, and is melted away after the model is complete.

There are several different techniques employed in rapid prototyping, each capable of modelling with different types of material and with differing levels of cost and accuracy.



Selective Laser Sintering (SLS), Stereo Lithography (SLA), Multi-Jet Modelling (MJM) and Electron Beam Melting (EBM) all use a similar basic technique. A vat of modelling material (either a powder or a liquid) is contained in a fabrication chamber. A scanner passes over the surface of the material, either fusing it together in the case of SLS and EBM, or curing with UV light in the case of SLA. Once the layer has been fixed the object is lowered until the material covers it again and the process repeated. In some cases the material has to be topped up after each pass.

### Commercial Systems

Technology	Materials	Description
Selective Laser Sintering (SLS)	Nylon, glass and metal	Selective Laser Sintering uses a laser to fuse layers of powder. The laser scans a bed of powder fusing materials according to the CAD design.
Stereo Lithography (SLA)	Photopolymer Resin	Stereo Lithography uses liquid polymer resin that is 'cured using UV light'. The UV light is scanned across the surface of the liquid polymer hardening it to create the 3D model.
Laminated Object Manufacturing (LOM)	Paper	A roll of paper is moved across the fabrication area, cut and glued to the previous layer. The roll then moves on and the process repeated to build up a prototype.
Electron Beam Melting (EBM)	Metal	Similar to SLS but using an electron beam to fuse metal.
Fused Deposition Modelling	Metal Alloy and Polymer Resin.	A nozzle sprays the material onto the modelling area. The nozzle can move in three dimensions.

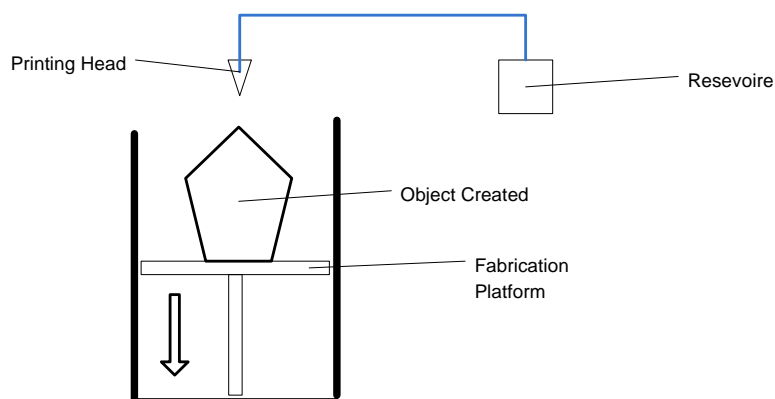
### CAD/CAM interfaces

The interface between the CAD software and the rapid prototyping tool is the Standard Tessellation Language (STL) file. An STL file describes a 3D model using a series of connected triangles. These can be interpreted and converted into a layered 3D model for prototyping. An alternative, although not as widely used file format is the Polygon File Format (PLY) developed by Stanford University.

### 3D printers

As well as a specific technology, 3D printing refers to a number of rapid prototyping systems that are optimised for speed, ease of use and relatively low price, with the aim of becoming the equivalent of the inkjet printer for the CAD/CAM market. What

these systems gain in speed and price, they lose in accuracy and therefore cannot be used to create prototypes for components with very low fault tolerances.



3D printing systems differ from traditional rapid prototyping systems in that they do not create a model by scanning a bed of material, but rather by spraying successive layers of material onto the fabrication area. This material is fixed either by being bathed in UV light or by the application of

adhesives. Most often two printing heads and reservoirs are used, with one system supplying the support material and the other supplying the finished material.

#### *Plaster and resin*

zCorp's 3D printing system is a similar system to SLS. It uses an adhesive applied via a printing head, rather than a laser, to fuse the modelling material. Successive layers of plaster are deposited in the fabrication bed and bound together with a starch-based adhesive. This has the advantage of being inexpensive to use, but the models created are relatively fragile. These units start from around £15,000 and can easily be fitted into a workshop or classroom. Chris Winslow, a tutor in theatre design, used a zCorp printer at the University of Alberta to create a 3D model of a theatre set.

<http://www.zCorp.com>

<http://www.winslow.uk.com/tech.htm>

#### *Photopolymer*

A cross between stereo lithography and inkjet printing, this system used by 3D Systems and Objet, spray photopolymer directly onto the model. The model is constantly bathed in Ultra Violet (UV) light which hardens the polymer after it has been deposited. These systems can be quite slow as the polymer takes time to set and the fabrication area restricts the size of models that can be created. However, once dry, the models are harder than those made from plaster and resin. The prices for systems usable in education start from £10,000 and can fit on a workbench.

<http://www.3dsystems.com>

<http://www.object.com>

#### *Fused Deposition Modelling (FDM)*

FDM uses a robotic nozzle contained in a temperature controlled chamber to apply a melted polymer or metal alloy directly onto the previous layer of the model. The chamber is kept at a temperature just below the melting point of the material being used, to allow the material to solidify as soon as it is applied. Although offering one of the cheapest unit costs it is very slow in operation. Interestingly FDM has been the focus of two low-cost do it yourself projects. RepRap and FAB@Home. Both offer

low cost methods of creating FDM fabricators with Fab@Home offering kits that start at \$500 and complete systems from \$3500

Although some commercial rapid prototyping systems can create complex components and even finished electronic products, the 3D printing tools lack the definition and breadth of materials to create precision electronics. Projects like RepRap and Fab@home do offer the possibility of creating printed circuit boards through 3D printing and are capable of creating the basics of more robust electronics, including copies of themselves.

<http://www.reprap.org>

<http://www.fabathome.org>

#### *Laminated Object Modelling*

Although it is older technology and the materials available limited, it is surprising that Laminated Object Modelling (LOM) may provide the basis for cheap rapid prototyping in future. Already there are desktop models available and, with the principle fabrication material being paper or transparent plastic. It offers the lowest cost per use of any of the systems. 3D systems currently market a LOM fabricator under the title Invision LD

<http://www.3dsystems.com>

#### *The future*

3D printing offers an insight into the direction rapid prototyping is heading. Although it will be a long time before such systems become common in homes, there is now a competitive small business and education market driving technology forward and costs down. Spurred on by zCorps 3D printer, several of the established rapid prototyping manufacturers have reacted by creating entry level models. This trend of simplifying technology and reducing price is likely to continue over the next few years.

This means that where rapid prototyping was once the domain of universities and large corporations, it is now possible for colleges and schools to use the technology. Some specialist schools such as Ossett School and 6<sup>th</sup> Form College are already using 3D printers to improve their engineering teaching and we may well see such equipment becoming available through local authority resource centres or low cost fabrication centres. Indeed, some universities and commercial companies already offer this service, charging prices starting at £50 for a mobile phone sized component.

<http://ossett.schools.wakefield.gov.uk/web/?contexts=2&presContexts=9&presContextB ranch=-1&menu3=164&content=183&page=2>

Some analysts look even further forward, speculating that 3D printing will allow the 'transmission' of 3D objects and finished products via networked 3D printers in homes and offices. This is possible in theory now, but the range of objects that can be created is limited by the types of materials used in fabrication. Once selective layer sintering becomes a consumer technology this may change, but for the time being Fused Deposition Modelling offers the best opportunity to create complex finished products. Organisations such as SIGGRAPH (the Association of Computing

Machinery Special interest group for Graphics) run future looking events and workshops that cover this area.

[http://san-diego.siggraph.org/events/TDP/TDP\\_0503.html](http://san-diego.siggraph.org/events/TDP/TDP_0503.html)

[http://san-diego.siggraph.org/events/TDPPSP/TDPPSP\\_0605.html](http://san-diego.siggraph.org/events/TDPPSP/TDPPSP_0605.html)

<http://www.siggraph.org/s2007/>

## **Hardware news**

### **One Laptop per Child**

The One Laptop per Child (OLPC) project has announced a rise in the cost of the basic XO laptop computer to \$176. The laptop designed to be a low cost computer for deployment in the developing world, was previously marketed as the \$100 laptop, but increases in costs have forced a revision of this policy. However, the OLPC project now includes support for Microsoft Windows and Windows-based applications.

This now brings the XO laptop within the same price bracket as Intel's existing Classmate laptop and the new Intel/Asus Eee laptop. The Eee features 7" and 10" screens and a 2 Gigabyte solid state Flash drive rather than a traditional hard drive. Manufacturers such as Fujitsu, HTC and Samsung are all planning laptops based on the same Intel Ultra Mobile PC (UMPC) reference architecture for release later in the year.

<http://itw.itworld.com/GoNow/a14724a165368a296047229a8>

[http://www.asus.com/news\\_show.aspx?id=7378](http://www.asus.com/news_show.aspx?id=7378)

### **New Flash hard drives shown at Computex**

Flash memory makers SanDisk launched two new Flash drives for desktop and laptop computers. The drives are 64 Gigabytes in size and are designed to replace traditional hard disks. They fit as exact replacements for current drives, so no modification of the computer is necessary. Several new ultra portables have adopted Flash drives including the Eee computer, the XO and the Palm Folio, with reduced weight and power consumption being a key factor. Market research firm iSuppli is now predicting that more than half of new laptops sold in the fourth quarter of 2009 will be using Flash drives instead of traditional disk based hard drives.

[http://www.computextaipei.com.tw/presscenter/news\\_view.shtml?docno=797](http://www.computextaipei.com.tw/presscenter/news_view.shtml?docno=797)

<http://www.isuppli.com/news/default.asp?id=7869>

### **New developments in human computer interaction**

Research is increasingly focusing on new approaches to human computer interaction (HCI) in an attempt to make more intuitive, human centred interfaces. Two new devices have been announced recently exploring new techniques for people to interact with computers.

BT launched a new add-on device that, once attached, allows users to move the cursor, access menus and interact with programs on their computers. The new adaptor known as 'BT Balance' is intended to be plugged into a laptop or tablet PC. The technology was originally designed to assist people who have difficulty interacting with computers using a mouse.

<http://www.btplc.com/news/articles/showarticle.cfm?articleid=852a2036-bf4b-4ae5-b81a-7935b786e12a>

Microsoft has launched a new form of touch sensitive computer called 'Surface'. Surface includes a flat operating screen that is scanned by motion capture sensors. These sensors capture the movements made by the user as they interact with the screen and interpret them into commands. An interesting feature is the ability to use objects such as paint brushes to interact with the screen. Using a modified Vista Operating system, the table-like computer allows more than one user to input at any time allowing for collaborative use. The system is also capable of recognising objects placed within its control area and launching commands based on their presence (eg mobile phones). This has interesting possibilities for early computer learning and collaborative projects.

<http://www.microsoft.com/presspass/press/2007/may07/05-29MSSurfacePR.msp>

### **Intel announces mobile developments**

Intel announced their new McCaslin Ultra Mobile Platform in April. This uses chips formerly known as Steeley, but now called A100 and A110. These are designed for mobile phones, PDAs and other small computing devices, known as Ultra Mobile PCs (UMPC). Intel plans further improvements to the platform to follow in rapid succession, with a version based on the 45 nanometre low power chip 'Menlow', called Ultra Mobile PC 2008 and a new single processor chipset named Poulsbo later in the same year. In addition Intel has created a forum to support Linux on what it calls Mobile Internet Devices (MID) also known as Mobile Internet Multimedia Devices (MIMD). Intel unveiled two prototype MIMD designs together with McCaslin. The Elektrobit and Compal MIMDs feature 5" LCD touch screens, slide out keyboards, wireless networking and an operating system called MIDinux, a mobile version of Linux,

In a further development, Intel has announced the release of a PC on a single chip. The chip called 'Tolapai' uses 45 nanometre technology to integrate the core processor with integrated chipset, and encryption co-processor. Initially intended for server appliances, consumer chips featuring integrated graphics are being considered.

[http://www.intel.com/pressroom/archive/releases/20070417corp\\_a.htm](http://www.intel.com/pressroom/archive/releases/20070417corp_a.htm)

<http://www.itworld.com/Tech/4535/070605asustek/index.html>

### **AMD developments**

AMD has announced a new multi-core desktop computer processor for release later this year. The chips, known as 'Phenom', are built on the 45 nanometre Barcelona architecture. The new Phenom chips will be available in dual and quad core varieties to compete with Intel's Core Duo and Xeon.

<http://www.amd.com/gb->

[uk/Corporate/VirtualPressRoom/0,,51\\_104\\_543\\_544~117412,00.html](http://www.amd.com/gb-uk/Corporate/VirtualPressRoom/0,,51_104_543_544~117412,00.html)

AMD also announced new multi-core Turion X2 chips that claim to offer reduced energy usage and better support for mobile technologies. The new multi-core Turions will incorporate support for the 802.11x wireless networking specifications and nVidia graphics processors. AMD also announced their mobile platform 'Puma' this month. Puma will build upon the Turion X2 chips but features the 'Griffin' architecture combined with the RS780 chipset.

[http://www.amd.com/us-en/Processors/ProductInformation/0,,30\\_118\\_13909\\_13910,00.html](http://www.amd.com/us-en/Processors/ProductInformation/0,,30_118_13909_13910,00.html)  
[http://www.amd.com/us-en/Corporate/AboutAMD/0,,51\\_52\\_1991~117501,00.html](http://www.amd.com/us-en/Corporate/AboutAMD/0,,51_52_1991~117501,00.html)

### **New classification of ICT users**

A new study by the Pew internet project has found that many American adults have a distant relationship with technology. The project surveyed 4000 people and categorised them into 3 groups: 'Elite users', people who regularly use ICT in their daily lives and participate in social networking and user created content; 'middle of the road', people who see ICT as performing a utilitarian task and not for self expression; and 'few technology assets', people for whom technology is at the periphery of their lives. The study found that for a variety of reasons 49 per cent of people fell into the third category and that hardware and software developers have some way to go before bringing this group on board with technology.

<http://www.technewsworld.com/story/57267.html>

A Further study by internet metrics firm comScore found that more Europeans are online than Americans, with 144 Million Europeans online everyday compared to 122 Americans. The UK was found to be the most active web using nation with UK citizens spending an average of 34 hours online a month.

<http://www.comscore.com/press/release.asp?press=1459>

### **New examination security measures**

Schools in Idaho, USA, have banned iPods from tests after its students were discovered using them and similar music players such as Zune to cheat. Some students recorded possible answers as tracks playing them back in the examination, while others used the track descriptions to display cribbed notes.

[http://www.usatoday.com/tech/news/2007-04-27-ipod-cheating\\_N.htm](http://www.usatoday.com/tech/news/2007-04-27-ipod-cheating_N.htm)

Closer to home the awarding body Edexcel has announced that they will start trialling the use of Radio Frequency Identification (RFID) chips for exam papers. The chips will contain data on the number of exam papers in each batch, and will be scanned when despatched, and again upon arrival at the test centre, and the information compared. This will speed up the identification and tracking of lost and stolen examination papers.

<http://www.edexcel.org.uk/about/media/news/2007/security.htm?&bb=False&sg=RFID>

### **DisplayPort developments**

Dell will be integrating its DisplayPort connector into its monitors later in the year. DisplayPort provides bi-directional power and communication between the PC and the monitor. Effectively acting as a powerful Universal Serial Bus (USB) style connection, multiple monitors can be strung together in a daisy chain approach, or additional peripherals such as speakers or microphones can be added, allowing one PC to drive many monitors for presentations and classroom teaching.

Although the work was started by Dell, they have since passed the development on to the Video Electronics Standards Association to maintain as a specification and later develop as a standard. Since then a number of other manufacturers have come

on board including HP, Phillips, Lenovo and Samsung. DisplayPort now competes with the High Definition Multimedia Interface in use by Sony, Panasonic, Toshiba, Hitachi and others.

<http://www.vesa.org/press/displayportaug.htm>

[http://www1.euro.dell.com/content/topics/global.aspx/innovation/en/cto\\_display\\_port?c=uk&l=en&s=corp](http://www1.euro.dell.com/content/topics/global.aspx/innovation/en/cto_display_port?c=uk&l=en&s=corp)

<http://www.hdmi.org/>

### **JISC study into identity management**

The Joint Information System Committee (JISC) has commissioned a project to investigate the problems of identity management within Higher and Further Education. The project, which is being managed jointly by Cardiff University and the London School of Economics, will be performing identity management audits of 10 partner institutions and hopes to survey the remaining 640 HE and FE institutions over the next four months. The project hopes to better understand the issues surrounding single sign on, password management, and provisioning.

<http://www.angel.ac.uk/identity-project/index.html>

### **Green computing news**

Focus on energy usage is shifting from the processor and hard drives to RAM, according to IBM. Users driven by software requirements are demanding more memory, which can consume up to 14 watts of power for one memory module. When some manufacturers are shipping servers with 64 memory slots it is clear that memory is now one of the areas requiring most power within a server system.

<http://www.techworld.com/opsys/features/index.cfm?FeatureID=3337&email>

In a move they believe will reduce energy usage IBM has developed a thin client workstation that can run 3D graphics processing on the server reducing the need for expensive heat generating graphics cards.

<http://www-03.ibm.com/systems/bladecenter/hc10/index.html>

A UK commercial initiative aimed at promoting the adoption of green computing technology has been launched. The Green Technology Initiative has brought together a disparate group of IT companies to promote the use of existing technologies to reduce energy usage.

<http://www.greentechnologyinitiative.org/>

A similar global initiative called the 'Climate Savers Computer Initiative' has also been launched by Intel, Google, Dell, HP, Lenovo and others. This group has a clear goal to reduce greenhouse gas emission by 54 million tons per year by 2010. The initiative intends to meet this target by making computer power consumption 90 per cent efficient.

<http://www.intel.com/pressroom/archive/releases/20070612corp.htm>

This group will have to overcome the difficulties in raising the priority of green computing in IT procurement. A recent survey by the US based Forrester Research group found that investment by technology companies such as MAD, Cisco and Intel has not resulted in a change of procurement strategy.

<http://www.forrester.com/Research/Document/Excerpt/0,7211,42347,00.html>

## Software and internet

### Analysis: service oriented architecture

#### *Principles of Service Oriented Architecture*

Service Oriented Architecture (SOA) is a concept in software systems architecture design rather than a specific technology. The concept in its broadest sense is that different software functions communicate using standards based methods in order to present a coherent and unified whole. Each function can be developed independently and does not need to know or take account of the underlying platforms of other component functions.

This allows different existing components to be integrated using standards based methods to fulfil new needs within the organisation. The reuse of existing components reduces the cost of development which instead can be focused on the new elements of functionality and integration, rather than redeveloping existing functions.

One of the issues with Service Oriented Architectures is a lack of common understanding regarding what SOA actually is and how to represent it in design. The Organisation for the Advancement of Structured Information Standards (OASIS) is currently working on a reference model for SOA which hopes to develop more rigidly defined guidance for developing SOA systems.

#### *Loosely coupled systems*

Within an SOA system it should be possible to change component applications without the need to rewrite any of the other component pieces. This is because the communication between components conforms to a standardised set of functionality and uses an agreed syntax for communication. Conformance to interoperability specifications can be limiting, however, as only that functionality that can be described in the specification can be shared. If new ways of working are needed it may not be possible to represent them within existing standards or specifications, requiring bespoke interfaces to be created.

#### *Modular Components*

A component-based approach allows systems to be selected individually based on their merits rather than selecting a bundle of functionality or being tied into a single vendor system. Within SOA each component can be selected and hosted separately and combined to produce the same result. Each component can then deliver its specialism, thus in theory producing a better system when joined together. Should a better component be developed it can replace the existing component without needing a major redevelopment of all other components. This offers far greater flexibility in how the functions are served and what software and hardware choices are made. A modular system even allows some functions to be hosted externally and supplied as managed services yet still integrated into a common local application. This modularity allows the IT systems to change quickly and flexibly with the needs of the organisation.

### *Re-use of systems*

The component-based approach used in SOA allows components brought in for one application to be reused throughout an organisation or elsewhere. Should a new system need to be developed it can be assembled from existing modules leading to cost savings and better supported systems.

### *Technologies*

SOA is a design principle that that can be implemented in a number of technologies. These technologies primarily focus on web services although other possibilities are available. Most programming languages now allow some form of web service integration, but the best known are Java and the Microsoft .NET framework. These two programming toolsets allow developers to create simple function calls to remote procedures and allow the development of server based interfaces to receive remote procedure calls.

Many software, hardware and service companies now support SOA development including Sun, Microsoft, IBM and HP. Sun, IBM and HP offer advice on developing and governing SOA development programmes. HP offers a suite of SOA test and management software such as LoadRunner and Service test while IBM offer a number of standard SOA components supporting their WebSphere enterprise server.

With both .NET and Java's AJAX tool, a developer can point the tools at the remote service and they will automatically create simple functions (or stubs) that contain most of the code necessary to call the remote system.

The principles of service-oriented architecture are not bound to web technologies however, and could be implemented using any network-based transfer technology. It is possible to use the international z39.50 and MARC specifications to integrate library records, or to use network news transfer protocol (NNTP) to integrate forums and discussion groups, neither of which uses the web hyper text transfer protocol (HTTP). The principle of reuse and the convenience of web technologies does mean that most SOA are implemented using either web services or web based Representational State Transfer (REST) applications.

One of the fundamental technologies that underpin a lot of SOA development is XML. XML is a method for describing data, and data structures. As such it is very helpful when creating SOA applications. Because XML is a standard for describing data it is easier for people to interpret the data to be created and received within an SOA application. Within web services XML is used to describe both the messages and the services. Within REST it is often used as the method for describing the data sent back to the calling service.

### *Web services*

Although often used to describe all web-based system to system applications, Web services properly refers to the specification issued by the World Wide Web Consortium (W3C). Web services describes a standardised framework for the sending, receiving and responding to service to service function calls across the internet based on HTTP.

Within web services there are two important sub units, Web Service Description Language (WSDL), an XML description of the services available on a server, and Simple Object Application Protocol (SOAP) an XML description of the messages sent and received via a web service. The web services specification also includes Universal Description Discovery and Integration (UDDI) which describes a method for creating repositories of service information for potential clients. It is a way of discovering web services where you do not already know the server information.

An alternative to Web services is represented by Representational State Transfer (REST). REST is again a conceptual method rather than a specific technology and describes methods by which simple functions can be sent and received via the web, using existing HTTP methods. REST advocates the use of functions built into HTTP such as PUT, GET, POST and DELETE to represent actions to be carried out on a remote system. So adding a user to a database would be represented by a PUT command sent to a specific URL. Because of this, REST actions can be transmitted using far less text than is required for SOAP, which in turn means the application will be faster. However REST is limited in the complexity of operations it can describe and as such may not be suitable for all applications.

#### *e-Framework*

Originally a JISC programme, the e-Framework is now an international effort to create an integrated Service Oriented Architecture to support education. The e-Framework has represented all activity within an educational institution as a concept. It then attempted to develop standardised methods for describing and delivering that concept, with the possibility of combining each application developed into a flexible educational system. At the heart of the e-framework is the idea of common or shared service: the services that are likely to be reused by all other applications in the institution. These could include messaging services, access management applications such as Shibboleth and Security Access Markup Language (SAML), or learning resource management systems. A good example project is MyGrid an open source application for distributed computing.

Another key aspect of the work of the e-framework is the use and development of open standards. Where possible, the e-framework makes use of existing educational interoperability standards such as the IMS content packaging specification used in JORUM, and the NLN Materials to describe content in a way that could be read by VLEs. However, there are some areas of activity where no standard exists and e-framework projects have been set up to explore possible solutions. XCRI is a good example; XCRI is a specification designed to describe course information in a machine readable way for sharing between applications.

#### *The Schools Interoperability Framework (SIF)*

SIF is a specification to enable interoperability between disparate systems. Requests for particular data are managed by a central hub that directs the client request to the appropriate server. This differs from most web service applications, which work on a point-to-point basis where services communicate directly with one another. One potential advantage of the SIF style approach is that no single service

needs to know about another service or its methods for communicating, it only needs to know how to communicate with the hub. Becta are currently running pilots of the SIF system with schools in Birmingham and Northern Ireland.

<http://www.sifinfo.org/>

#### *The future*

Service Oriented Architectures promise much in the way of flexible systems, however the approach is relatively new and the implications of the approach are yet to be fully understood. One of the key areas for consideration is the level of granularity at which service are created. Too low and a system will slow down as large numbers of relatively inefficient messages are passed between components that do not really need to be separate. Too large and the value of the SOA is lost. Another key issue is failure to properly plan a SOA. Concepts such as reuse require an analysis of existing business processes to understand which services can be reused and which cannot. This is potentially quite a complex task. Finally, making a system dependent on synchronous communication with other systems through the internet increases vulnerability should any link in the communication chain be broken. So in short there is considerable promise offered by SOA but planning and integration challenges should not be underestimated.

The JISC has created useful animations the explain the SOA approach and the e-framework

[http://www.jisc.ac.uk/whatwedo/programmes/programme\\_eframework/soa](http://www.jisc.ac.uk/whatwedo/programmes/programme_eframework/soa)

## **Software and internet news**

### **XP no longer to be sold on PCs from 2008**

Windows XP will no longer be available on new retail PCs from January 2008 according to Microsoft's software lifecycle page. However, it will still be available for new corporate systems until 2009.

<http://www.microsoft.com/windows/lifecycle/default.mspx>

In a move to bolster the use of legitimate Windows licenses in the developing world Microsoft unveiled a new 'Unlimited Potential' product. The product, a bundle of Windows XP starter edition and Microsoft Office Home and Student 2007, will be sold to the developing world for \$3 per license for government funded computers. This package may also be made available to disadvantaged groups in the developing world through government schemes and programmes such as Windows starter packs. Intended for educational use, the package will be released in the later half of 2007.

[http://www.microsoft.com/Presspass/exec/billg/speeches/2007/04-19GLF\\_Asia\\_Keynote.mspx](http://www.microsoft.com/Presspass/exec/billg/speeches/2007/04-19GLF_Asia_Keynote.mspx)

In other news, Naace and Microsoft have signed a deal that will allow students in UK education to purchase Microsoft software at greatly reduced prices. The scheme, available through retail partnerships such as the software4students website, offers a reduction of up to 80 per cent with no expiration of the license once the course has

been completed. A wide range of Microsoft software is available including Office 2007.

<http://software4students.co.uk/index.htm>

### **Open source in the public sector**

A recent survey carried out by public sector market analysts KableNet, has shown an increasing use of open source software within the public sector. The survey, sponsored by Redhat, questioned 182 organisations within the public sector finding that 35 per cent of respondents were using some form of open source software. Of those questioned 25 per cent were using open source to support web-based applications, with the main drivers being cost savings and reducing the reliance on a single supplier. Technical knowledge by staff was seen as the greatest barrier to using open source with perception of risk being another major factor.

This may be impacted by Microsoft's claim that the Open Source community infringes 245 of their patents, and may encourage users to adopt distributions that have signed agreements with Microsoft such as Novell and Xandros.

[http://money.cnn.com/magazines/fortune/fortune\\_archive/2007/05/28/100033867/index.htm](http://money.cnn.com/magazines/fortune/fortune_archive/2007/05/28/100033867/index.htm)

<http://www.kablenet.com/kd.nsf/Frontpage/B6A23D8412409EC0802572CE005552DD?OpenDocument>

### **Windows Server update**

Microsoft has announced the latest beta release of their 'Longhorn' server software. The operating system is now officially named Windows Server 2008. Featuring a number of improvements to existing technologies such as, as Windows Terminal Services and Server Manager, the key development is 'Server Core'. Server Core allows the windows server to be stripped of features and applications that are superfluous to the function required. This means that Windows servers can now be dedicated to a single role within a network cluster such as Domain Name Server, print server or authentication server.

<http://www.microsoft.com/windowsserver2008/default.aspx>

### **Apple announce Safari for Windows**

Apple has released a public Beta version of their Safari web browser for Windows. Safari contains an open source html rendering engine, known as WebCore, which is shared with Linux based browser Konqueror. It includes support for Standard Vector Graphics (SVG), Javascript and Java. Access to WebCore and Javascript core elements is available from Apple's OpenDarwin.org site which also includes the source code for their Darwin Media server. Apple has also recently previewed the next version of their OSX operating system codenamed 'Leopard'.

<http://www.apple.com/pr/library/2007/06/11safari.html>

### **New social software research**

A new report by research company hit-wise has highlighted trends in using social software and user created content. The report found that users of web 2.0 have followed similar usage patterns to established internet community usage, such as newsgroups and forums, with the vast majority of people reading, but not

contributing to the content. It is estimated that for most sites that encourage user contribution, about 1 per cent of the users actually added content.

<http://www.hitwise.com>

Usability expert Jakob Nielsen has criticised some of the current trends in web development. He has compared the fashion for personalisation and social networking, loosely termed Web 2.0, to the dotcom boom, when style was favoured over usability. Citing the results of the hitwise survey, Mr Nielsen questioned the desire by many sites to offer user created content, when the majority of users want simply to view content. Mr Nielsen further advised companies to get the basics of design right before looking into Web 2.0 functionality and to be careful about targeting teenagers over other groups of users.

<http://news.bbc.co.uk/1/hi/technology/6653119.stm>

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

### **Internet safety and security**

A recent report by the NSPCC suggests that more than half of UK children have had a negative or unwanted experience when using the internet. The report, issued to coincide with the launch of 'don't hide it' initiative, was built on a survey of users of the social networking site Habbo Hotel. The NSPCC hosted a virtual drop-in centre in Habbo Hotel in the UK as part of an earlier initiative.

[http://www.nspcc.org.uk/whatwedo/mediacentre/pressreleases/2007\\_14\\_may\\_nspcc\\_urges\\_children\\_to\\_stay\\_safe\\_online\\_and\\_speak\\_out\\_about\\_abuse\\_wdn45818.html](http://www.nspcc.org.uk/whatwedo/mediacentre/pressreleases/2007_14_may_nspcc_urges_children_to_stay_safe_online_and_speak_out_about_abuse_wdn45818.html)

In a further report by internet security firm Garlik, it was found that out of 500 young people aged between 8 and 15 surveyed, 20 per cent had met contacts made online in person. Only 7 per cent of parents were aware of this activity. Further statistics show that 40 per cent of children visit sites specifically prohibited by their parents, while 12 per cent give out their home address.

<http://www.garlik.com/press/Garlik%20Press%20Release%20-%20Kids%20at%20Risk.doc>

A recent study into cyber-bullying by the University of Nottingham investigated the phenomenon of 'griefing' in Second Life and other internet games. Griefing is the deliberate negative disruption of another player's game; examples being shooting, hitting and creating annoying objects. The study found that it is often carried out by experienced users who wish to show off to newer players.

[http://www.nottingham.ac.uk/public-affairs/press-releases/index.phtml?menu=pressreleases&code=NOES-97/07&create\\_date=30-may-2007](http://www.nottingham.ac.uk/public-affairs/press-releases/index.phtml?menu=pressreleases&code=NOES-97/07&create_date=30-may-2007)

Becta advice on internet safety can be found at:

<http://schools.becta.org.uk/index.php?section=is>

### **Mobile web changes**

A recent study by internet metrics company Comscore has shown an interesting trend in web use, with a large number of people below the age of 35 accessing the web from mobile devices. In the UK, 65 per cent of 15-35 year olds access the web this way, roughly 20 per cent of the number accessing the web via PC. The study found that in the UK age is more of a factor in mobile web use than in the USA, but

gender is a serious differentiator in both countries, with the primary adopters being young men.

<http://www.comscore.com/press/release.asp?press=1432>

### **Public sector online services survey**

UK government services portal DirectGov has published the results of a survey into people's preferences for new online or connected services. The survey focused on five groups: parents, teenagers, over 50s, disabled people and motorists. This study found that truancy alerts, already available in some areas, was top of parents preferences, together with online disciplinary records and participation in school governance online. For teenagers virtual tours of colleges and universities were of interest together with virtual driving lessons and earning money online. Overall 60 percent of respondents wanted more government services to be online.

[http://www.direct.gov.uk/en/NI1/Newsroom/DG\\_068423](http://www.direct.gov.uk/en/NI1/Newsroom/DG_068423)

### **Simple programming and development tools**

The Massachusetts Institute of Technology (MIT) has announced a free software tool that allows users to create simple animations similar to Adobe Flash. The software, known as 'Scratch', uses the squeak programming language, and allows students to create simple animations and games. Users programme by dragging action elements together into an action path, with reference to objects within the animation being available through drop down lists. The tools, designed to be used by anyone from 8 years old upwards, offer the potential for an entry into computer programming and development.

<http://scratch.mit.edu/>

Microsoft has also launched a simple programming tool called 'popfly' to support their Silverlight animation tool. Popfly uses a similar concept to Scratch with users manipulating generic blocks to create actions such as communication with Flickr. The service relies on the user having an account with popfly where they get access to the popfly explorer containing all the generic code elements.

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

### **Language tools and programming interface added to Google**

Google has added automatic translation tools to their search technology, both for entering search terms and for displaying the sites found. The service allows users to enter search terms in one of eleven languages, and request results from sites written in a specific language. For example users can search websites in French using search terms in English. The returned results will then be translated back into the language used for the search term. When the site is discovered, Google stores a temporary version of the page, which it then translates. There are limitations however, as only the HTML text content is translated as yet no conversion is available for text in images or flash files. In a further move, Google's local search client Google desktop has added Hindi to the list of languages indexed on the client computer.

Finally, Google have opened up an AJAX Application Programming Interface (API). The API will allow developers of small application and extensions to Google functionality known as 'mash ups' to more easily integrate some aspects of Google functionality.

[http://translate.google.com/translate\\_s](http://translate.google.com/translate_s)

<http://googledesktop.blogspot.com/2007/04/desktop-5-goes-global.html>

<http://www.techworld.com/applications/news/index.cfm?newsID=8612&pagtype=all>

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