



Today's information industry: applications and trends on the Internet

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1. Introduction

In this paper some of the ways in which the Internet is being used for a wide variety of applications are explored together with how these have developed into trends. Most of the details have been gleaned from press releases and news items on the Web itself. Although the paper started off with a mind to divide what follows into applications and trends, it was found that the two areas were not necessarily distinct and what was perhaps a trend was actually based on a new application (e.g. the trend towards wireless Webs or 3-D chat rooms or to shop online).

Browsing the World-Wide Web (the terms Web and Internet are used more or less interchangeably in this article) one can come across all kinds of pages that show how it is being used and applied: companies are using it to sell just about anything direct: real-estate, medicine, books, software, insurance; auctions are being conducted daily; you can find out about holidays and make travel reservations; people are dabbling in stocks and shares on a daily basis (and losing heavily!); companies are advertising jobs and vacant positions; people are advertising themselves; it can be used to print out valid postage stamps; live Web cams enable viewers to share the mundane home lives (and loves) of ordinary citizens or experience the view of animals drinking at a lake in Africa; the alternative operating system Linux is given away free over the Internet; the Net is used as the first publication vehicle for landmark court decisions, the Starr report, trials and so on as well as for the first operation, the first birth – just name it – the list is virtually endless!

Equally, reading through announcements, news items, articles and the like on the Web, there are a

number of Internet trends which are being described. They include advertising, push technologies that deliver customised material to the desktop, smart cards and digital wallets, bandwidth and compression, faster access using technologies like asymmetric digital subscriber lines, desktop videoconferencing, more intelligent and discerning meta search engines, shrinking browsers, and browser wars (although Netscape's Navigator is popular with business users and has a large number of installations, in fact, in terms of actual usage, Microsoft's Explorer is apparently outnumbering Netscape by a three-to-one margin), XML, and replacing the familiar URLs with even more familiar common names and words.

It would take far too much time to talk about all these developments here and describe all the new improvements for paying on the Web or to browsers and search engines coming along. So the paper is limited to covering, in no particular order, a few of what are believe to be the more interesting ones.

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2. Content is king

It is content which is encouraging millions to flock to the Internet. According to Dataquest, the total number of Europeans online in 1998 was more than 35 million. Internet penetration across Europe is expected to reach 17% by the end of the year, although 20% penetration is believed to be required for the Internet to be a viable sales channel. This figure has already been reached in some countries in Scandinavia and others such as the UK, Germany, The Netherlands, Austria and Switzerland are almost there. The emergence of global players, cheap broadband services and free Internet access are spurring growth (1).

Following in-depth interviews with major online content publishers in the USA and Europe, a recent study from Datamonitor has shown that adult content dominates the paid content market (2). In fact adult content accounts for 69% of the \$1.4 billion online content market (i.e. subscription and pay-on-demand and not including e-commerce and advertising revenues). Thus almost \$1billion is spend on porn! This is likely to nearly quadruple within five years and far and away outstrips other products such as games, music and sport – though the latter two especially are likely to develop rapidly from pay-per-view broadcasting of sports events and concerts (3). A similar report from Forrester Research estimates that three American porn sites have a gross income of \$100-150 million annually, principally from subscriptions (and these subscriptions are typically very low, in the order of just a few dollars per year).

Since the total value of all money transactions on the Web for goods and services (i.e. including e-commerce) amounts to around \$9 billion, then porn makes up roughly 10% of economic activity on the Web. An interesting way of looking at this is to consider that if the Internet were your local high street, then every tenth shop would be a sex shop! (and indeed this was almost the case in cities like Copenhagen, Stockholm and Amsterdam not so many years ago). What the Internet has done, though, is to almost personalise pornography and make it more easily accessible to many. People, especially couples, who would not be caught dead in a sex shop in their local town have fewer qualms about browsing porn sites on the Web in the comfort and privacy of their own homes.

US sites amassed 84% of all paid content revenues from US and European consumers – largely because the US possesses the largest number of online households and has the lowest telecommunications costs, and consequently produces sufficient demand for content. As a result more US companies are adopting the Internet to publish content in their various sectors. By comparison, in Europe, the UK accounts for a mere 7% of all paid content revenues, with France and Germany having 3% each, and the rest of Europe sharing 3%. The overall European market share is expected to increase from 16% in 1998 to around 22% in 2003 when the UK will have some 42% of European revenues (2).

According to some pundits, the least-available content on the Web is that from books. Just about any kind of newspaper, magazine and journal is on the Internet, much music is freely downloadable, images abound – yet the number of electronic books, despite activities such as Project Gutenberg in the US and Project Runeberg in Sweden, remains limited. However, the e-book business is poised to take-off with the launch of several new products (4). The advantages are enormous: store capacity is effectively infinite; e-books can be printed or downloaded on-demand from anywhere; opportunities exist for interactivity between the author or other readers; authors can have greater control over their own content, marketing, copyright ownership, and readership.

Even libraries need not lose out. Forty or so publishers have signed up with a new Internet service – the Colorado-based netLibrary – to offer the contents of their traditionally published titles to libraries and their users (5). Anytime, anywhere access will be provided to a comprehensive collection of reference, scholarly and professional electronic books (eBooks) and information that can be viewed, searched and checked-out via the Internet. Some 2 000 titles are already available and netLibrary expects to be offering nearly 10 000 titles by the end of the year. It is netLibrary's mission to integrate the convenience, access and capabilities of the Web with the familiarity and depth of content that patrons find at their local or university library. An eBook may be checked out and viewed online or downloaded and read offline on the user's computer free of charge. If already checked out, the user can queue for it and are notified when it becomes available. Single pages of information can be printed. Clearly, this is a totally different concept to on-demand publishing like Project Gutenberg, where users can download and/or print out the entire text of electronic books for free.

An important factor for the US dominance of paid content revenues is that currently 70% of global Internet users speak English as their first language – thus there is more chance of revenues being generated by English-language sites. One way that non-English sites are trying to combat this dominance is by offering multilingual pages. It has, in fact, long been a complaint that so many Web pages are in English – but this is inevitable given that currently most Internet users are English-speaking. However, by 2002 it is believed that the majority of worldwide Internet users will be non-English speaking and by 2005, six out of ten Internet users are expected to speak a language other than English (6). Already apparently there has been an astronomical growth of Japanese and Chinese on the Web – though it has recently been estimated that Chinese still only amounts to about 1% of the total number of Web pages.

Not only does this imply that Web pages will abound in other languages, but the predominance of non-English speakers means that it is imperative for companies to offer multiple language choices on their Web sites. This is happening already, of course, but usually the other way round. For example, a Dutch or Swedish company could have its pages in the local language while providing additional pages in English for the international user. CNN does provide various versions of its news pages in languages other than English and the search engine Alta Vista offers the possibility to translate the retrieved Web pages into other languages – rather hit and miss, but at least possibly better than nothing. Companies in some bilingual nations (e.g. Canada, South Africa and Wales) do have sites in both languages, and some international organisations (such as the European Commission) provide pages in their official languages. Such multilingual sites are expected to be the norm by about 2001.

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3. Shopping Online

British firms are apparently losing out to their 'web-wise' American rivals because they have been slow to launch home shopping sites on the Internet. Although a fair number of large companies such as Boots, Marks & Spencer, Sainsbury, Littlewoods, Tesco and Next do have an online presence, they are not making the most of the Internet potential. Only 14% of the top 100 retailers in the UK allow customers to actually buy goods online compared to 43% of America's largest 100 businesses. The result is that would-be shoppers are tending to visit US sites to buy goods especially when they offer prices of up to 40% cheaper than British shops (7). Of course, because Americans are more used than the British to buying products through mail-order catalogues, this probably helps account for some of the sluggish online trade in the UK. By 2003 total world-wide Internet trade is estimated to be worth nearly a staggering £2 trillion – that's half the figure for the total international trade today. Britain's share is expected to be some £6 billion! By the same token, some American analysts expect high-street travel agents, banks and insurance brokers to disappear within a decade or so in some areas and be replaced by round-the-clock online equivalents. Mind you, services and communications will have to be fast and secure and cheap for this to catch on.

The problem is, though, that until lines are speeded up tremendously – and more particularly the 'last mile' – then the Internet will not be the most efficient and effective means of shopping, etc. Even with higher speed modems, it just takes too long at home to wait for pages to load. Companies putting up their services on the Web have got to make their pages less cumbersome and busy and more snappy to load and read. Some of the fancy images, Java scripts, sounds – while very nice – make for slow loading and detract from the overall main content of the page. And people do not want to hang around and wait online and thus pay for slow access. In fact, it is estimated that slow download times at online shopping sites could place at risk nearly \$4.5 billion in US e-commerce revenues each year. Online shoppers would apparently wait up to eight seconds for a site to download and more than one third of Web users surveyed would give up trying to buy things over the Net if they got frustrated with

the shopping experience (8). Zona Research, that conducted the survey, says that online companies must quicken download times to avoid losing sales and customers to regular shops. In fact, the situation is not confined to shopping. It is believed that as much as \$3 million may be lost monthly due to slow securities trading, and almost \$3 million is potentially at risk because of poorly performing travel and tourism sites.

On the other hand, a new report from Jupiter Communications finds that some 94% of Web shopping comes at the expense of regular shopping (9). Of the almost \$12 billion consumers are projected to spend online during 1999, about 6% or \$¾ billion will be purchases that would not have been made in regular stores or through catalogues.

Although e-commerce currently accounts for only a fraction of US retail sales, traditional retailers will increasingly need to become involved in Web operations to complement their offline business. Conversely, for Web-only retailers the low percentage of incremental buying forces companies to work harder to retain existing customers and not to lose them to competition. However, a recent survey by Verdict Research in the UK found that 54% of people believe that the Internet will never replace stores.

The Internet too is being used in smart houses: in Japan homes are being constructed with wall-to-wall fibre optics connecting rooms to each other and to the outside world and the Web (10). Occupants can monitor the activities and uses of appliances throughout the house – even remotely. The fridge can be programmed to keep track of its contents and when an item is low, then it can automatically reorder more from the supplier. Supermarkets in the UK like Tesco and Safeway have Web sites, indeed Tesco provides free Internet access to customers. Shoppers are also being given PalmPilots equipped with barcode scanners that can be used for entering and downloading shopping lists (11). By using intelligent data mining techniques, Safeway is able to compare customer lists and come up with promotional items likely to appeal to people buying similar goods. The company is also working on providing electronic banking, and links with airlines and travel companies could follow. Littlewoods, a departmental store, has established an interactive TV channel which is linked to the Web – the channel is currently geared to online shopping but the link with television promises soaps and quiz shows in addition. Libraries could clearly come up with similar ideas – have intelligent shelving which recognises when the last copy of a book has been borrowed, or create client lists of preferences based on books borrowed, for instance.

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4. **Bandwidth and broadcasting**

Low-cost telecoms services from video phones to fast Internet access could be available to British homes next year after the government announced plans to auction off under-utilised radio frequencies thus allowing companies to offer broadband services. (12). Lowering the cost of broadband communications (which permit higher speeds and better capacity for video pictures) and making it available in remote areas where cable is too expensive is seen by the government as a vital step to increasing Internet access in Britain. Although mobile phone companies already plan to launch their own Internet and video services via radio, the availability of new frequencies aimed at domestic users is expected to dramatically increase competition.

Besides the delivery of digital music over the Web, thanks to the MP3 file format, there are a growing number of sites that offer live radio programmes and Web casts over the Internet. Web surfers can listen to the radio while working either online or at their desks (though the latter is probably a more expensive way to do it than just by having the radio on, unless one is in an office environment where the Internet connection can be left on all the time). One question that is being asked is whether talk radio is the Web's next killer application – the promotional power of talk radio is apparently hard to resist (13). There is a certain affinity between the Web and Talk Radio – both are alternative message-delivery systems that appeal to people who are not necessarily wild about mainstream media and both have the key element of interactivity since the listener can talk back by phone or modem. Clearly libraries could extend the children's story hours they might hold to radio and indeed create other historical and cultural or topical Web-based radio or TV programmes based on their stock and collections.

On the other hand, compression technology is improving such that PC users will soon get good quality for less bandwidth. Broadcasting over the Web will then offer more promise for television and video than it does now with the small window for viewing. The key to it all is effective management of

the flow of streaming media. New digital video tools and standards enabled the Internet to host the first full-length digital movie in May this year – the distribution of films over the Net for theatres can practically eliminate the cost of more traditional forms of distribution (14). Since video-on-demand applications with multiple users are likely to use up a lot of bandwidth, having the content of such applications closer to the user is something that is under development. Several companies are active in this area. SightPath, for example, is shipping a suite of tools for pushing rich media content out to the fringes of corporate LAN and WAN networks: standard video media is collected for distribution to SightPath appliances, which sit on the local area server and can connect up to 20 simultaneous viewers. The actual content is pushed down overnight when network loads are typically at their lowest peak and end users can connect via a standard Web browser and media player the following day to view the material locally and rapidly (15).

An interesting development is a plan in China to make the Internet available over high-speed cable networks rather than the conventional telephone network. The estimated current four million Internet users in the country would be dwarfed by the projected 80 million cable subscribers who would have access. The core of the cable Internet service would be a fifteen city Internet backbone with local cable companies supplying the final mile. The service would address the two most common complaints by China's Internet users, namely high fees and low speeds. The price would be a one time fee of around \$60 plus a monthly fee of about \$6 – currently access via China Telecom is around \$24 per month. With current Internet users estimated at some 63 million worldwide – could the system cope with the addition of more than double that number in one fell swoop (16)?

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5. Beyond the desktop

Another interesting development is the palm portal – a software client which is migrating beyond the browser. Besides news and e-mail, portals like Yahoo!, [Excite@Home](#), MSN.com and America Online are bundling everything from chat to Internet radio and telephony services into software applications that run in a small window on the desk top. All that is needed is a connection to the Internet. However, portal developers are arguing that the future lies beyond the desktop – already the Internet has spawned to television screens, cellular phones and other devices, and portal companies are ready to follow it wherever it roams. By visiting the [Excite@Home](#) site, the user can configure an assistant to dock onto his desktop and deliver headline news, stock quotes, horoscopes, local TV listings, etc. (17).

The portal can travel with users in a Palm VII wireless device and in the future the user will be able to access the portal while watching TV via a set-top box. The aim is for applications being able to serve content and services to Excite users anywhere and on many different devices. Software clients offered by other portals provide similar information and services. Yahoo! is looking to establish its portal on non-PC equipment such as hand-held devices and Internet appliances such as Web-TV. The company has formed a partnership with Online Anywhere, backed by Motorola, which provides technology allowing content providers to reformat and package Web content for hand-held computers, televisions and wireless devices such as pagers and Internet appliances (18).

The 'beyond the desktop' concept will be strengthened with the emergence of wireless hardware devices (19). Wireless communication (based on radio-frequency or infrared technology) could threaten the dominance of portals as information brokers and signal an end to banner-ad revenues for companies like Microsoft. In fact, wireless networks could connect people directly to huge back-end servers, thus by-passing the Internet and robbing portals of both traffic and content. This hasn't stopped companies such as Microsoft and Yahoo! from making deals with other companies such as Palm Computing, Sprint PCS and PageNet, to provide wireless personalised content and services to subscribers. Yahoo!'s strategy is to expand wireless access to its portal server (named Yahoo Everywhere) with the addition of the Yahoo Mobile Web site. Yahoo Mobile works with devices based on 3Com's PalmPilot as well as palm-size devices running Microsoft Windows CE operating system. Yahoo has also signed partnership deals with companies in Germany, Hong Kong and Korea (a deal with the UK is expected soon), while Microsoft has acquired a firm in Sweden (20).

Dataquest predicts that revenue for wireless services (including phone, two-way paging, data-only networks and Internet access) will reach some \$3 billion by 2003. The Internet, especially e-mail, is considered the major driver of wireless data and the emergence of digital networks will increase the ability to access the Internet and conduct transactions wirelessly (21).

In another move, the computer operating system Linux, is expanding beyond its currently installed base of Web and e-mail servers. Companies are beginning to look seriously at Linux as an operating system for a new range of Internet-enabled devices and applications which is sweeping the industry (22). And the latest development is a computer slightly larger than the head of a match which can be built for less than \$1. Embedded in household applications (such as VCRs, camcorders, coffee makers, porch lights, etc.), the computer could be activated via the Internet by people on the road or in the office (23).

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6. Advertising and income

Advertising is seen by some as one of the most exciting aspects for the potential that the Internet offers and growth is phenomenal (24). In France, Internet advertising revenue was up five-fold in the first quarter of 1999 (to around \$10 million) with the faster growth areas being the automotive industry, mail order and business. In Germany, the online ad market is forecast to grow to some \$1 billion by 2003 – that's just over 3% of the total German advertising market.

Free applications on the Web are constantly appearing and just as television offers free entertainment or local newspapers and magazines are distributed freely because they are subsidised by advertising, so Web sites offer free software sponsored by ads. NetStudio has recently launched a free Web graphics program that doesn't require any downloading, installing or training and permits the user to improve the appearance of Web pages by creating buttons, banners, headlines, photos, etc. by logging onto the NetStudio site (25). The product is an Internet-based service for which in effect no charge is made (the free version offers only 25% functionality of the main product). The idea is that the ability to create free graphics will generate an enormous amount of traffic on the Web and in turn generate a real revenue from banner advertising. Sceptics wonder about the long-term viability of such a business strategy.

Actually, in an effort to increase revenue, Web advertisers are starting to break out of the banner ad model. Take PKZip – to make up for revenue lost when people never end up paying for the hardware version they downloaded, the company has decided to use ads and message sponsors in the latest shareware version (26). This means that instead of residing on the Web, they actually reside in the application's software. Each time the users connects to the Web, PKZip automatically replenishes the ads with new ones. Advertisers like the idea because their ads pop up constantly to the same viewer, whereas a visitor to a Web site sees the ad there only while surfing that particular site. Once the user leaves the site, the ads are gone – minimising their impact. (PKZip did look at more normal methods of trying to enforce registration by using fixed time periods for the trial software or making it less functional than the registered version, but decided that these methods did not result in increased registration rates and thus were not worth the time and effort to implement).

To convert surfers into online advertising dollars and transactions, the online services like Yahoo!, Microsoft and America Online want to try and keep users locked on to their sites and not jump around. Hence, the growth of portals and Netcentres and a myriad of services ranging from source directories, instant messaging, free e-mail, prize lotteries and the like which aim at creating brand loyalty and retaining business through one-stop shopping.

Another trend in Web advertising is to make user experiences with Web ads richer and more effective by replacing the staid banner ads with banners integrated with animation, sound and transaction functionality to attract greater visibility and visitability.

Many companies, Amazon.com is one, give people money if they put their banner or logo on their Web pages and surfers click on it and so reach the company. Apparently individuals can generate significant income from this. Because of the ability to accurately track all kinds of information about those visiting a site (such as IP addresses, Web browser information, details of plug-ins, referral information, sites and pages visited, etc.) it is thus unnecessary to attract millions of eyeballs since advertisers can target very specific groups or markets.

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7. Free access and more

Free Internet access – all the rage in the UK where phone customers pay by the minute and are

reluctant to pay even more for monthly Internet access fees – would apparently be difficult to sustain in the USA where flat rate local telephone charges are unheard of (27). Getting people online in the UK (and elsewhere where tariffs are high) to use the Web is in everybody's interest: increased telephone use for the phone companies and Internet service providers, increased hardware and software sales for companies such as Dixons, and an increase in the number of online customers for supermarkets such as Tesco. A couple of the telecom companies in Spain are also now providing free Internet access.

In the USA, until recently the only successful company providing free Web access was NetZero, which does it in return for customers' putting up with intrusive banner ads on the computer screen. But then last month Alta Vista launched a free dial-up Internet access program that offers unlimited Net service and e-mail – also provided users watch a constant stream of ads (28). The service requires customers to use a personalised MyAltaVista page as their permanent home page and a small window (which can be placed anywhere on the screen) displays ads while the user is online. Alta Vista also announced a MicroPortal service that remains open as a separate desktop window, displaying links to premier AltaVista services, and rotating customisable content. Users can configure the MicroPortal to show news, sports, financial data, weather, TV programmes, local content, etc. As a promotion gimmick, the company is giving away \$5 million worth of gift certificates for its Shopping.com site – the longer users keep the MicroPortal window open the more chance they have of winning gift certificates.

The near future may bring not only free Internet access, but free PCs, free modems and even free local phone calls (as they have in the USA). In the UK, Dixons' Freeserve Internet has enjoyed phenomenal success, though the services is not really free since the user has to pay a telephone service provider for every second spent online and Dixons gets a cut of that revenue (29). There are signs that the new methods of Internet access which don't rely on telephones (e.g. cable modems, satellite, ADSL) will not only be faster but also unmetered. Already British Telecom's online game service, Wireplay, has free phone calls for those playing the games. The price of a basic PC has dropped dramatically and a new generation of specialist Internet appliances capable of Web surfing, e-mail and home-shopping, and banking is being developed at little or no cost not only by computer companies but also cable and television companies. Some companies expect to get money back from advertising on the user's computer screen or perhaps a cut from every purchase made online through their machines.

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8. Cybercafés

Both increasing home access and free access to the Internet were supposed to seal the fate of the cybercafé, where one could check one's mail and surf over a coffee and danish. And although the number of such cybercafés has apparently halved in Britain in recent years, there are several new developments aimed at reviving the original concept first introduced in London by Cyberia.

Adhoc, a Cambridge-based new media publisher, is offering a fully-fledged bistro restaurant combined with arts venue (live poetry and music), second-hand bookshop and online event-booking service. The idea is that customers can see and handle products in near-by shops and then pop into the bistro to order the goods online at a discount of 25% or more while eating, drinking and listening. The service costs £1 per hour and is cheaper than the cost of home access telephone charges (30).

Not to be outdone, a month or so ago British Telecom unveiled the world's first telephone kiosk with 24-hour Internet access and e-mail facilities. BT plans to install 1000 of the kiosks in airports, railway stations and shopping centres by March next year. The company also plans to install a video link on the new 'multiphones', allowing the caller to see the person to whom they are speaking. The service allows users to set up free personal e-mail accounts or sign up with other e-mail providers. Users can e-mail and surf the Net on a pay-as-you-go using phonecards or credit cards with calls being charged at 10p (15 US cents) per minute. The phones also provide up-to-the-minute information on news, sport, travel and entertainment – much of which is free (31).

And the world's biggest cybercafé, called easyEverything, opened in London a couple of months ago with 400 terminals and 24 hour surfing for £1 per hour provided porn is not viewed. Launched by the founder of easyJet, a string of the warehouse-sized Internet cafés will be opened across London this summer and the aim is to offer a complete service to everyone. Internet experts are available to help customers when required (30).

In another development a company called Simply Internet has set up cybercafés in 15 or so motorway service stations and shopping centers. At charges of 12p (18 US cents) per minute (10p for children and students) they are apparently extremely popular with everyone – families, children and business men. Obviously people want access to the Internet from multiple locations – not just the home or the office, but also while on the move, even on holiday!

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9. Who's watching what?

The Internet, however, has yet to displace traditional entertainment, especially for kids, despite reports that Web use is growing. A recent survey from Arbitron NewMedia in the States found that almost half of children aged 8 to 15 preferred to watch television, listen to the radio, play videogames, spend time on the phone and even read books. The Internet ranked last among leisure activities (32). That is not to say that the Net is not being used – children are using it for educative and learning purposes with more than one third of kids saying that the Internet is their primary research tool for book reports and papers. This is probably due to the surge of computers in schools – a trend in the USA for years and a relatively recent phenomenon in the UK.

Of course, parents and teachers alike are worried that children might be finding other things on the Web and getting a different kind of education! Censorship of the Internet and filters to regulate public (especially children's) access to harmful material are proving difficult. In the USA, there have been several attempts at government regulation but none have been really successful (33). A federal judge ruled in late 1998 that it was unconstitutional for public libraries to filter access on all Net terminals. Of course, quite a few sites providing adult or other content unsuitable for minors do require age verification and there are a number of services available for this purpose.

On the other hand, with the Echelon programme the US and its allies are apparently collaborating to monitor the Internet for different purposes. In the past few months it has come to light that the US, Australia, Canada, France, Germany, Sweden and the UK, among others, have a massive surveillance network, known as Echelon – a joint project to monitor satellite transmissions, phone calls and the Internet (34). It is reported to work by using 'sniffer' programs that monitor data at six critical junctions on the Internet and suck in as much data and information as they can from e-mail, Web pages, user groups, news group postings and the like. The data are then submitted to a special dictionary which detects red flag phrases such as assassination of public figures, embassy bombings and the like.

Just a few weeks ago, the BBC news reported that British police had managed to thwart hooliganism at several recent football matches by monitoring the Internet. It is estimated that 90% of all traffic on the Internet is being scanned by intelligence agencies. Like the cookies and signature trails that people leave across the Internet whenever they visit a Web site – be it porn or otherwise – it seems there is little the public can do about this invasion of privacy. In any event, most people are unaware that this is happening and would apparently prefer functionality over security.

In future, though, Web sites will know even more about their visitors – they will also know more about their own content and the content of other sites and be able to customise information for those accessing their pages. There is a widespread Internet trend towards personalisation – where sites track what visitors tend to look at and offer it to them without their intervention. This already happens on some sites where the user can tell the system what s/he likes and the software then recommends products or services recommended by others with similar tastes. Amazon.com, for instance, tells users what other books people have bought with a topic like the one chosen. Other technologies can point users to sites that other people have visited for similar requests.

Then there are various types of intelligent agents tied to a site which query other sites to compare prices, say, and help users find the lowest price for a particular product. On the USA Today site, for instance, there is a calculator which allows you to compare the cost of living between cities. So, if the user lives in The Hague and wants to move to, say, London then if s/he makes say \$8000 per month in Holland, s/he'd need to make \$8759 to live in London (it's much cheaper to go to Texas!). But the interesting thing is that on the results page there are 'tailored' information areas, for example: 'Moving from The Hague? Then check out an analysis on selling your home there', or 'Moving to London, click for important information about relocating to the London area.' If you enter other cities, the text changes to provide details about those locations (35).

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10. **Better communications**

E-mail is by far the most popular Net activity, with many of the major portals giving away free e-mail addresses. But what is now coming into vogue with e-commerce is secure e-mail and this will have an impact on business use of couriers, overnight delivery services and fax. Important documents can be delivered faster, electronic messages can be encrypted, there can be certified delivery and tracking, whether the recipient has opened the message or not. UPS has invested in Tumbleweed Software, which provides software for secure e-mail services that enhances and customises electronic messages (36). NASA is licencing Tumbleweed's software to automate communications between the agency and its suppliers. Other users of secure e-mail are financial companies and banks, which are attracted by the speed of electronic delivery and the ability to cut costs. Another service is provided by ZipLip.com, which provides Web-based e-mail that allows users to scramble and lock the e-mail messages they send. The messages, which are encrypted (unlike those from free e-mail providers like Hotmail, Yahoo!, Netcenter, etc.) can be unlocked and read by recipients by means of a shared password and then can be 'shredded'. ZipLip.com has been available for some two months and is apparently already used by thousands of people in 30 countries (37).

Another venture to increase productivity is using an Internet faxing service. Faxomatic software from International Telecom, for instance, allows users to send faxes from any Windows application, without accessing the e-mail software by automatically forwarding the document securely over the Internet for immediate delivery. A huge variety of formats and fonts are supported (38).

Two Internet postage companies are targeting primarily small businesses and people who work from home with the sale of stamps for first class, priority and express-mail postage online. Customers can print stamps by downloading software from their Web sites and integrating it into PC applications such as Microsoft Word and Outlook. Stamps.com, whose software is free but whose users have to be online every time they want to print a stamp, makes its money by charging a 10% service fee on the \$10 minimum postage that a customer purchases at one time. E-stamp, on the other hand, charges \$49.99 for its software and a secure electronic vault postage storage device so users don't have to go online every time, plus a 10% convenience fee for postage purchase. The companies are selling their products through America Online as well as other Internet outlets (39).

An area which is coming to the fore in some countries is making Web pages more accessible to the visually handicapped. Apparently the UK government is making it law for all Web sites to be accessible by handicapped people. Webmasters need to be made aware of the possibilities – how to do it and what technologies to use. Although there are Braille output devices, printers, as well as text-to-speech software, there are also Braille keyboards and tactile graphic input interfaces (40). IBM has recently released its freely downloadable self-voicing kit which allows users to add, expand or customise Java applications with accessibility features such as an audio user interface that reads aloud what's on the computer screen. On the other hand, for partially-sighted users, simply using larger typefaces and better colour combinations will often do the trick.

And there are several sites on the Web offering 3-D experiences: virtually wander round ruins or cities such as Helsinki or even the International Space Station. Such virtual reality is being coupled with other applications, for instance chat rooms which abound on the Web and account for the largest amount of time consumers spend on the Internet. Small wonder then that 3-D chat rooms are becoming available where objects are represented in three dimensions and avatars move in and out of multiple virtual worlds (41).

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11. **Conclusion**

One application that was particularly appealing was the one where four naked volunteers were shut away in separate rooms during May to see whether they could survive for 100 hours with just a computer and a credit card. The idea was that they had to use the Internet to clothe, feed and entertain themselves (42). They were expected to make purchases via the Web and have their food and clothing delivered to their rooms and their only contact to the outside world was via e-mail, chat and online user groups. The group was monitored to see how they behaved under such circumstances and also whether the myriad of online services they could use actually worked. It seems that the moods of the participants got progressively better throughout the experiment. They enjoyed the social interaction online, had no problems ordering goods online, increased their skills on

the Net and got satisfaction from being able to use it creatively (e.g. sending electronic postcards, designing Web pages and including animation). An overall conclusion was that the Internet improves the quality of life and provided experiences unlikely to be obtained from other types of leisure activity (43).

But there are even more novel ways in which the Internet is being used. The Virtual Mummy project enables the mummy of a 2 300-year-old woman to be unwrapped and dissected on the Internet (44). The image of the mummy was made by scientists at the University of Hamburg by taking a series of X-ray cross-sections, then reconstructing them with the help of a computer. It is possible to provide views of the mummy from any direction, even from inside her skull (45). The technology has reached a point where computer-based 3-D body models (virtual bodies) can be examined in a way an anatomist or surgeon would do. By placing it on the Internet, it is essentially an information exercise, but one which brings to the interested layman an opportunity which s/he would probably never otherwise have to unwrap a mummy, by a simple mouse click. And what about the virtual voodoo doll which users can stick pins in, burn with hot wax from a candle, cut with a hook knife and then e-mail the image to someone they don't like (46)!

Many Web applications are just normal everyday activities and services – an extension in possibly the majority of cases of the way people ordinarily conduct business. The Internet offers a new and different medium for reaching a new and different clientele in a rather convenient manner (and also enables them to offer lower prices and transaction rates). Dell Computers, along with other such companies such as Gateway, exclusively sells via the Internet (47). CarsDirect.com is a new Net venture which plans to bypass car showrooms and salesmen in the same way that Amazon.com bypasses book shops – with cheaper prices benefiting the customer (48). Intel and Oracle expect to generate 100% of their software sales by the start of next year thus reducing the costs of doing business and potentially saving, in Oracle's case, \$500 million per year (49).

These and the other examples of applications described above show the tremendous diversity of material readily available on the Web and the ways in which it is being offered and used. We all know that we can find information there which we cannot find anywhere else. As the trends reveal, the Internet has given companies, organisations and people a whole new lease of life – enabling them to do things they never dreamt of before, giving them vast new opportunities for conducting their businesses, whether it be publishing, promoting, advertising, selling, informing, exchanging, buying, being aware. And for this we must be eternally grateful.

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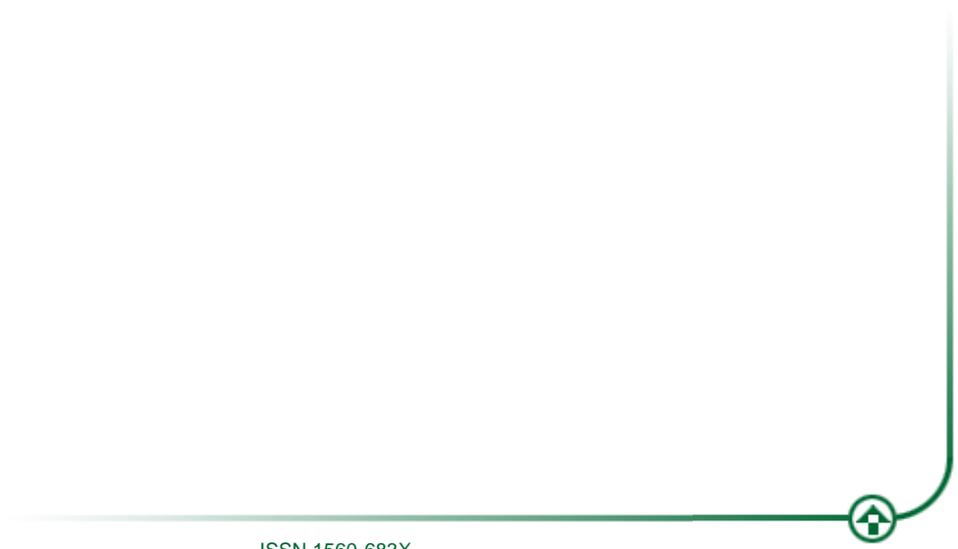
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