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http://www.hbuk.co.uk—the *European Journal of Surgical Oncology* and the Internet

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The popularization of the Internet through the World Wide Web heralds a new era in public and professional communication. The *European Journal of Surgical Oncology* is now represented on the Web at a site provided, developed and maintained by the publisher. We may expect to see rapid developments in electronic publishing, although the direction and general utility of these changes are not yet clear. This article introduces the *EJSO* Web site to the readership and considers the ways in which the Internet Revolution may bring benefits to the readership, the publisher, the editorial process and the Journal staff.

Key words: **Internet; World Wide Web; electronic publishing.**

Introduction

Dramatic advances in technology in the past few years have transformed the publicly accessible, international network of computers known as the Internet from a tool for computer specialists to a general communications medium. In a field of continuing rapid technical change, predictions about the future are unwise. However, the opportunities which the Internet provides are now becoming clearer. It is the purpose of this article to draw the attention of the readership of the journal to the opportunities for European surgical oncologists, to announce the Web site of the *EJSO*, and to invite contributions from the readership as to how this facility might best be exploited. It is assumed that the reader will have no special knowledge of the Internet or of the tools with which to explore it. More detailed information on specific aspects of Internet use by European surgical oncologists will be provided in future issues of the Journal.

Internet access

Magazines, books and articles about the Internet are commonplace.[1] The details of the means of connection vary considerably from country to country according to the form of the national telecommunications infrastructure. Individuals using the Net require access to a modern personal computer acting as a terminal; a modem to convert digital to analogue signals for transmission over the public telephone network; suitable software to browse the Net; and a telephone link to an Internet Service Provider. This may be a private company or a public body such as a University Computer Centre or a national telecommunications authority.

Communications on the Net are slower than public voice telephony, and the occasional user will have to spend time at each session loading software and accessing the Net. As with road networks, the speed of the system is determined by the calibre of the route (the bandwidth) on the main highways and the local lines, and by the volume of digital traffic, which is now immense. Ordinary public copper wire telephony bandwidth has a low capacity for digital data relative to newer technologies such as optical cable. Some users may have access to the greater bandwidth, available on Ethernet or ISDN systems. In the United Kingdom, the Joint Academic Network, JANET, which links most institutions of higher education and research, provides a high capacity national communications framework for professional Internet use.

Occasional users may wish to establish a home-based connection for out-of-hours convenience. This obtains access when the Net is less heavily congested (the World Wide Wait!), and facilitates a leisurely exploration of the rich resource of academic and professionally informative sites on the Net.

Forms of communication on the Net

The Internet allows the exchange of digital data between several million computers over a plethora of public and private telephone networks. The metaphor of a Web is apposite. Each node or provider can be reached by a multiplicity of routes on the communication networks. The utility of the Net derives from standardized file transfer protocols (ftp). Regulation of technical standards on the Net, and the allocation of unique identifier codes for the core, server computers, is undertaken by the international Internet Society (ISOC) (W19) and its various subcommittees. Until recent years, the Net was in the

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domain of computer specialists, but modern tools, which are astounding for their elegance and simplicity of use, have transformed this situation and have led to the creation and explosive growth of the World Wide Web.

The World Wide Web (W3)

The World Wide Web has become synonymous with the Internet for most users, since software was developed for the general user to move around the Net without special skills or training. One key development is the 'hypertext' link, whereby other computer and Web pages are accessible without the need for painstaking typing of computer addresses each time. There is now a range of simple-to-use, yet powerful, Web exploration software tools, or 'browsers', such as Netscape Navigator and Microsoft Explorer. The capabilities of these tools are extending rapidly. For example, the recently developed Java programming language will allow the study of three-dimensional images and the interactive use of computer programmes across the Net.

Each computer, web site and web page on the Net has a specific address, or Universal Resource Locater (URL). Most Web addresses can be readily recognized by their opening phrase http://www..., http standing for hypertext transfer protocol. These addresses can be reached by the Net user in a number of ways. The address can be typed directly into the navigation software. Alternatively, a web address may be embedded within the web page. The user is then able to move from one web site to another simply by 'clicking' on the relevant text. This is a particularly powerful feature of the Web. Each provider can configure the Web pages provide suitable links to other sites of interest.

In another approach, the browser may use a 'search engine' or computerized index, which is regularly and automatically updated by supercomputers which trawl the web and index every significant word. Search engines are generally non-selective in their approach to indexing, thus generating a huge number of contact addresses for web pages when common topics are searched. The explosive growth of the Web and the rapidly changing information environment makes a search of the web a particular challenge, and there is still a somewhat random process involved in finding useful information. A number of companies providing search engine services, with names such as Yahoo and Alta Vista (W1, W2).

Information is currently provided in two principal forms on the web; text and images. Unlike the printed page, web pages can be regularly updated and upgraded. Facilities are expanding on the Web for voice and moving image transmission and for more sophisticated applications such as the ability to move within a three-dimensional image space. The software houses are working to integrate conventional personal computer software with Internet functions, so we may expect the seamless interaction of 'stand-alone' computer software and Web functions in the near future. This may allow, for example, documents, reference database searches or images obtained from the Web to be incorporated directly into personal documents.

Journal publication and the Internet

The Internet provides opportunities for the editorial process, for the publisher and for the reader, and may lead to new forms of communication and interactivity. These opportunities are relevant to the clinical, scientific and publishing community in general, and to *EJSO* (W17) in particular. There will inevitably be a learning curve in the adoption of this new technology. We cannot yet predict the course of this evolutionary process, but we can identify some of the features and functions of the Net which may bring real benefits to all parties.

The challenge for the electronic publisher is to find a formula which will enhance and supplement the printed journal, which will expand the readership, and which will generate sufficient revenue benefits to justify the outlay, while minimizing administrative costs. Professionally established, designed and maintained Web sites will impose significant costs. Some commercialization and income generation will be necessary to sustain a Web site.

New software tools and provider systems facilitate the creation and posting of WWW net pages by individuals, private and public organizations, professional societies and associations. Many sites are currently experimental and freely accessible, as their publishers learn about the Web. As the Web expands, so those Web sites which are professionally produced and maintained, and which provide useful services will survive and succeed in attracting a larger following or readership. Web sites may thus be expected to adopt individual hallmarks, identities and branding within the constraints of the electronic screen. These hallmarks may include specific visual imagery, or links to other sites.

The relationship between publisher and editorial board

Web site production for a scientific journal requires professional organization and direction, and co-operation between the publisher and the editorial board. Electronic publishing shares many of the characteristics of paper publishing. The publisher possesses the professional skills, and the administrative and financial skills, and access to subscription lists, which are most likely to ensure the success of the venture. Examples of effective co-operation between publishers and scientific societies already exist. For example, John Wiley and Sons maintain a Web site for the journal Cytometry (W14).

The editorial process

Many aspects of the editorial process may be made more efficient by taking advantages of the capabilities of the Internet. This may produce savings in time and publication costs, and productivity gains which may accrue at each stage in the editorial process.

Submission of manuscripts. The submission of manuscripts through electronic media (diskette or on-line) may become commonplace (although backup printed copies may still be needed for reference). Distribution of papers to reviewers will be facilitated. Retyping and copysetting at the proof stage will become unnecessary. Proof-setters will be able to

perform corrections and to check references automatically. Further desirable functions in the publication process such as automatic language translation will become possible.

Peer-review of manuscripts. The present peer-review process is a compromise between the need for speed and the need for careful evaluation of submitted manuscripts. The fewer the reviewers, the greater the chance of peer-review bias and error. The Net provides new opportunities for large scale peer-review. For example, submitted manuscripts could be republished for a given period of time on the Web site, and comments and amendments invited from as many referees as were authorized to contribute opinion. Appropriate scoring and security systems would allow a much larger number of reviewers to be polled before acceptance of the definitive manuscript, at which time its formal publication in print would mark it as a document of public record.

Prepublication of abstracts and work in progress. The process of preparation and presentation of conference abstracts would be facilitated by use of the Net. Prepublication of abstracts might have certain benefits. It will allow selection of abstracts for oral or poster presentation by a panel of referees. It will allow revision of abstracts based on electronic peer-review, and the compilation of conference proceedings.

Publication of repetitive 'housekeeping' information. The regular publication of the instructions to authors, details of forthcoming meetings and other housekeeping information occupies valuable journal space and has significant costs. The Web site may become the preferred place for publication of such repetitive information. A further enhancement of the housekeeping process may be achieved in the publication of 'advice' to authors. One of the challenges of the editorial process lies in the assessment of manuscripts with errors of scientific conception and execution which are liable to result in rejection or significant revision costs. The publication of general editorial policy guidelines on a range of forms of research might in time have significant benefits for the journal and its readership, and help to improve first draft manuscripts. The cross-referencing on the *EJSO* Web site of editorials, reviews, texts, statistical guidelines and advisory articles from a variety of international journals will provide a valuable and accessible resource of constructive advice for intending researchers and authors in surgical oncology.

Opportunities for the publisher

The utility of electronic data. In electronic publishing, digital data rather than paper becomes the medium of communication for a scientific journal.[2] This opens up new publishing opportunities and cost savings, as electronic data may be used in a variety of applications. These include the publication of data and manuscripts on CD-ROM and other archiving capabilities, and the preparation of different versions of a journal to suit different markets, customers, and Internet needs.

The development of new markets. The posting of the journal on the Web allows new readership to be reached at a fraction of the cost of conventional means. For example, non-European languages and local editorial content may be added to address the Middle Eastern, Asian, African and American Surgical Oncology communities.

Administrative benefits and cost savings. The adoption of a well-maintained and well-publicized web site may in time be expected to reduce substantially the administrative costs of participating professional societies. For example, the British Association of Surgical Oncology would be able to circulate its membership with information on forthcoming meetings through the Web site, if necessary with reminder postcards to check the web site sent out by conventional mail.

Multilingual publishing. One of the most interesting challenges relating to the publication and dissemination of a truly pan-European or transcontinental journal is the hurdle of language. Readers in each European country may be expected to prefer to read publications in their own language. While a scientific journal might seek to publish in a number of languages, the printing and distribution costs for multiple language versions of a specialist circulation journal across Europe cannot be sustained using conventional technology and systems.

Internet publishing provides a cost-effective solution to the problem of multiple language publication, because it reduces substantially the distribution costs. One can conceive of a model for the *EJSO*, wherein the English version would be retained as the printed record to be made available to subscribers. The Internet would allow the publication of translations of every issue in each language on the Web site. Individual subscribers would then be able to download and print out their own language version. This approach would still impose editorial costs for translation, but that process might in turn be facilitated by language translation software, and by on-line editing of manuscripts by associate editors fluent in each language.

A new style of publication. Much information in a conventional journal and in individual scientific papers is unlikely to be read by the general reader, who will tend to focus on the title, the abstract, the summary, the conclusions, and who will often skim the remainder of the journal. The Web provides the opportunity for the journal to publish papers in a truncated form, with a Web page reference to the extended article. The shorter, printed version would then serve as the document of public record, while extended versions with data sets might be made available on the Web or collated on disc and issued separately as a companion to the printed version.

Web site linkage. The power of the Web lies in the ability to link directly from the home site to other relevant Web sites. These might include other oncology journals, reference databases, or organizations for cancer research. Given the size and speed of expansion of the Web, this linkage will be an evolutionary and dynamic process, and will require the contributions of the readership to maintain its utility and relevance.

Journal archiving and other reference functions. The web site may also be used to archive past issues of the journal, thus facilitating historical literature searches, for example. The web site may thus evolve as an electronic reference manual for surgical oncologists.

A press and media briefing resource. There is a continual need for informed briefing of the press and media on matters relating to surgical oncology. The journal's web site would allow the posting of press releases, briefing documents and the referral of enquiries to competent authorities among the membership, via the e-mail system.

Advertising. New forms of advertising are being developed for the Net. One such method is to provide links from a pubisher's Web site to the Web site of a commercial organization.

Internet opportunities for the readership of EJSO

Currently, the *EJSO* is represented by a web site provided by the publisher at hbuk.co.uk. This site contains information of general relevance to the journal, such as instructions to authors, subscription details, and the composition of the editorial board. It also provides an opportunity for registration and comments.

It is possible to envisage a number of enhancements which may be of specific value to the readership of the *EJSO* and to members of affiliated organizations. Their adoption will be determined by a number of factors, including the economics of the web site, the proven demand for the services, and the contribution of the readership. The latter is likely to expand as more and more professionals use the Internet in everyday life.

General communications. The *EJSO* Web site could be developed as a tool for communication between the journal publishers, the editorial board, individual readers, and members of affiliated organizations. It may provide hypertext links for e-mail addresses, news and bulletin boards. The web site provider might maintain e-mail and contact lists of members for access through Web pages. It may also allow interaction with the membership, for example in the provision of electoral balloting for affiliated organizations, or for readership surveys.

Electronic mail. An important function of the Net is the transmission of electronic messages, or e-mail. E-mail is both immediate and cheap. A variety of software packages have made the sending of e-mail a simple task for users with access to the Internet. E-mail may be linked to data files, allowing the exchange of large data packages, such as documents, very efficiently between remote locations. It is usually deposited in the recipient's host provider computer for subsequent 'collection', and e-mail should thus only be used for urgent transmissions when the sender is sure that the recipient will be checking his mailbox regularly. If this is not the case, then telephone or postal mail may be more certain to reach the addressee.

User groups and bulletin boards. User groups and computer-based bulletin boards provide fora for discussion of a wide variety of subjects. They are widely used by enthusiasts for the expression of opinion and the exchange of news, but their style is often idiosyncratic. A list of medical newsgroups is maintained at Johns Hopkins University (W18).

Reference databases. The range of information on the Web is as broad as human imagination permits, but even within the field of oncology there is a wealth of resources. Numerous scientific and medical databases are accessible through the Net. These include medical literature reference sources such as the UK BIDS database. However, most on line search systems do not yet have the speed and convenience of use and access of the CD-ROM-based systems such as Medline which are now installed in most hospital and University libraries. This balance of utility is likely to change as access tools for on-line searches of public databases become reconfigured to the World Wide Web.

Home sites for cancer organizations. Various public organizations such as the British Library (W3) and the US Library of Congress (W4) provide entry ports to the international network of professionally and academically valuable sites. In the field of oncology, many public, private and charitable organizations already have a presence on the Web, and are sources of useful information. In Europe, these include the EORTC (W5, W6), the International Union against Cancer (W7), and elsewhere the National Cancer Institute (W8) and the American Medical Association (W9).

Home sites for scientific journals. Many of the principal scientific journals have Web sites which have considerable utility. It is now common to publish an index of the latest issue, back issues, and selected abstracts or articles. Among those with a well-established Web presence are Nature (W10), New Scientist (W11), Science (W12) and Scientific American (W13), Cytometry (W14), the British Medical Journal (W15) and the New England Journal of Medicine (W16).

Distance learning. The Internet provides an ideal opportunity for personal improvement and education at times suited to the individual, using the huge resource of the Net, or in connection to institutes of higher education. Publication of educational articles from *EJSO* on the Web site may facilitate this process.

New forms of communication. As the technology evolves, we may expect new forms of professional communication to emerge. For example, multimedia tools will allow the dissemination of video imagery, such as new operations or techniques and of three-dimensional imagery such as that derived from MRI and CT scanning. Internet video conferencing may facilitate the editorial process, while the conduct of virtual seminars will allow personal contact at a fraction of the time and cost of physical meetings.

Clinical trials. The Internet may facilitate the conduct of clinical trials in a number of ways. The Web site may post

a list of ongoing trials in surgical oncology across Europe, with the relevant documentation and opportunity for recruitment of clinicians and patients. It may also announce forthcoming trials and act as a vehicle for the management of trials, including recruitment of clinicians and patients. Considerations of confidentiality and security are likely to constrain the posting of patient documentation and clinical details across the Net until very secure data encryption is available.

Limitations of the Internet

The Internet browser will find a large and growing body of useful information for professional purposes. However, the system is still technically and logistically immature. Current limitations include slow speeds of access and transmission at many times of the day over the public telephone network. Fast links such as ISDN and Ethernet can be obtained, but the cost for the general user is usually prohibitive. Image transmission is a particular problem. Images use more digital data to construct than do text pages. Thus, image transmission over the Net imposes substantial time penalties. The general user is advised to select the 'text only' option in browser software. The user retains the options to download images for specific applications. Well-designed Web pages will be configured such that their information content 'stands alone' in text form.

The limitations to image transmission will diminish as the bandwidth (the data-carrying capacity) of the Internet infrastructure expands, and as faster modems and local lines are installed. Optical cable systems such as are now being laid in many European cities offer the potential for huge increases in bandwidth. Intending domestic users of the Internet should investigate their local options carefully.

Limitations to electronic publishing

Many electronic journals are now being published on the Web. They claim as advantages: speed of publication, the ability to publish large volumes of data, and online peer-review. They have found particular favour in the physical sciences and in molecular biology, where huge volumes of data such as results from astrophysical, particle physics or gene-sequencing studies, must be published. However, the printed journal remains a peer-reviewed document of historical reference and public record, which is unlikely to be substituted entirely by electronic journals in the near future. Electronic data are transient and ephemeral, and cannot be referenced as can the printed page.

Another advantage of the printed page is that it can hold and convey more text and images at a glance than can a standard computer screen. The printed page remains a superior medium for transmission of information to the human eye and brain. A printed journal is far more portable and thus convenient to use than a desktop computer. This advantage may diminish as technical advances such as low-cost portable computers with flat screen, high definition, lightweight colour displays are introduced, and as notebook computers with mobile digital telephone access to the Internet become more widely available.

Most importantly, the printed journal is defined by tangible factors such as size, form, colour, texture and paper quality. These give the product a character, and brand identity which is lacking on the computer screen. Any publisher who ventures into the electronic medium will thus seek for the foreseeable future to augment or to supplement the printed page rather than to replace it.

The challenge to journal Web site providers

The technology of the Internet offers remarkable opportunities for local, national and international communication within the clinical, scientific and oncological community. However, it also poses considerable challenges for the managerial boards of scientific journals and professional societies. The application of technology for the sake of technology will serve no useful purpose and will waste scarce resources. The Internet challenges us to consider the nature and function of scientific publishing, and the nature and psychology of the readership.

The browsing of a printed scientific journal which arrives through the post is a relatively passive process. The readership of the written journal includes those who actively subscribe and those who read it in the course of browsing in a library or in seeking out a cross-referenced article.

In contrast, the electronic reader must actively seek out material on the Internet. This requires a willingness to acquire and to use the technology, and a regular opportunity and incentive to visit a particular Web site. This reader may be an active subscriber, with access to information of professional utility, and of commercial value to the publisher, or a casual visitor or 'surfer' of the Internet. The journal Web site will contain hierarchies of pages of information of varying interest to the browser. It is a challenge for the Web site publisher to capture the interest of this 'browsership' and channel it to the printed journal, to optimize the architecture of the site and to maximize the utility and efficiency of the site for the browser or subscriber. The editorial team will need to oversee the content of the Web site to ensure that it is regularly updated. In simple terms, Web sites are likely to succeed if they become doorways through which the browser may step into a new world of opportunities beyond the threshold.

Profiling the Web site

The profile of the Web site on the Internet will determine its browsership. The profile can be raised by conventional forms of publicity, and by Web linkage. Thus, the more Web sites throughout the world which contain references to the *European Journal of Surgical Oncology* Web site, the greater will be the browsership. This requires a degree of reciprocity with other Web site publishers, with Web sites in a variety of related disciplines, and with commercial advertisers.

The way forward

We may expect to see a gradual expansion and maturation of the electronic publishing process in tandem with development of the printed journal. We may expect an increase in the general use of the Internet by surgical

oncologists and others. In order to make progress and to assess the level of connection of subscribers, readers, surgical oncologists and other professionals on the Internet, it is hoped that subscribers to the *EJSO* and affiliated organizations will visit the Web site of the *EJSO* and register their presence, their comments and suggestions on the electronic form provided. All Web providers are on a learning curve with a technology which promises to revolutionize the publishing process and human communications as radically as did the telephone a century ago. We may expect considerable turbulence, much excitement and a few blind alleys on this journey into the 21st century.

The Journal will address Internet-related issues and resources on a regular basis and will remain abreast of the opportunities which this revolutionary new medium provides for the various disciplines which make up the world of surgical oncology.

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Selected Web References

All Web addresses begin with "http://www.". All World Wide Web references are numbered W.. in the text.

Search engines and sites for commencing medical searches

W1.	altavista.com	(Alavista search engine)
W2.	yahoo.com	(Yahoo search engine)
W3.	portico.bl.uk	(British Library resources)
W4.	loc.gov	(US Library of Congress)

Medical and oncology organizations

W5.	nci.nih.gov	(US National Cancer Institute)
W6.	eortc.be	(EORTC)
W7.	telescan.nki.nl	(EORTC)
W8.	uicc.ch	(UICC, Europe)

Medical and scientific journals

W10.	nature.com	(Nature)
W11.	newscientist.com	(New Scientist)
W12.	science-mag.aaas.org	(Science Journal)
W13.	sciam.com	(Scientific American)
W14.	wiley.com	(Cytometry)
W15.	bmj.com	(British Medical Journal)
W16.	nejm.org	(New England Journal of Medicine)
W17.	hbuk.co.uk	(European Journal of Surgical Oncology)

Newsgroups

W18.	world-health.net	(List of medical newsgroups)

Web administration

W19.	isoc.org	The Internet Society

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