



**Global Forum  
for Health Research**  
HELPING CORRECT THE 10|90 GAP



# **Health Research for Policy, Action and Practice**

## **Resource Modules**

**Version 2, 2004**

**Module III**  
**Promoting the use of knowledge in policy  
and practice**

**Unit 5**  
**Electronic tools for managing knowledge**

We welcome readers' comments to enable us to continually update  
and improve this material.

THE COLLABORATIVE TRAINING PROGRAMME

Alliance for Health Policy and Systems Research  
Council on Health Research for Development  
Global Forum for Health Research  
INCLEN Trust

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## Acronyms

ASP	application service provider
DANIDA	Danish International Development Agency
EIP	enterprise information portal
HINARI	Health InterNetwork Access to Research Initiative
HTML	hypertext markup language
INASP	International Network for the Availability of Scientific Publications
IRC	Internet Relay Chat
ISP	Internet service provider
IT	information technology
KM	knowledge management
OECD	Organisation for Economic Co-operation and Development
OKN	Open Knowledge Network
PERI	Programme for the Enhancement of Research Information
SIDA	Swedish International Development Cooperation Agency
UNESCO	United Nations Educational, Scientific and Cultural Organization
URL	uniform resource locator (World Wide Web)
WHO	World Health Organization

## Module III. Promoting the use of knowledge in policy and practice

### Unit 5. Electronic tools for managing knowledge

This unit provides an overview of the use of electronic tools to:

- communicate – using various methods of e-dialogue
- work together – using digital web-space
- disseminate knowledge – using the Internet, CD-ROM and DVD
- locate and access information.

It goes on to consider Internet resources of particular interest to developing countries, ways of accessing them and the dissemination of knowledge generated in developing countries.

There are two **Tools and Resources** sections.

1. [“Tools and Resources: an introduction”](#), providing basic information.
2. [“Tools and resources for everyone”](#), providing more complex information for those who wish to use, establish or manage various electronic tools.

Managing knowledge should of course not be reduced to just the use of electronic technology to capture, locate and disseminate/share knowledge. Such technology has to be seen as only one component of the wider and more comprehensive picture of knowledge management, defined as the “mediating process between producing and using knowledge”.

#### Knowledge and knowledge management

**Knowledge** is “the ability to understand the relevance of information and to understand how to use that information to advantage. Knowledge is information that is embedded in a context, has a purpose and leads one to seek further information in order to understand something about the world more clearly. Knowledge allows us to make sense of information, relate information to our lives and know when information is irrelevant” (Saravanamuttoo, 2000). Knowledge can relate to a single idea, or refer to what one person knows, or relate to numerous interrelated ideas, shared by groups of people working together or otherwise interacting in an office, a community or in society and culture at large.

It can be **explicit** in the sense that it can be expressed in words and discussed by everyone. However, much knowledge in organizations and communities is **tacit**.

See [Recommended Reading](#) for:

- a discussion of the importance of tacit knowledge and organizational learning in Johannessen et al. (2001)

With the tremendous explosion in information in today's world, there are problems both in **finding** and in **sharing** relevant knowledge.

Personal knowledge can only be obtained by processing and organizing our individual sources of information. An organization potentially has access to the sum of knowledge of all of the individuals within that organization. However, this is seldom the case, because of less-than-perfect communication between all individuals within the organization. One of the purposes of **knowledge management** is to improve this situation.

Knowledge management can include the following.

- Inventorying, cataloguing and collecting (aggregating) what you already know (in particular explicit knowledge).
- Capturing tacit or intuitive knowledge (which includes local knowledge embedded in oral tradition, folklore, etc. – that is, local knowledge not codified in “scientific” narrative form).
- Locating what is known by others but not by you (i.e. searching for and retrieving knowledge).
- Sharing/communicating knowledge (involves packaging knowledge for a particular audience/function/context, packaging knowledge “to be found”, delivering it to particular audiences).
- Appraising knowledge (determining its potential worth or value). This is an exercise in filtering out the useful from the not-useful, using a variety of filters. Examples of filters include: quality, contextual (including cultural) appropriateness, and so on.

Knowledge management has become strongly linked with the idea of automating the sharing process. The use of technology to capture, locate and share knowledge is increasing rapidly. This unit introduces some of the principal technology used in knowledge management.

### **Knowledge management technology**

There are many types of technology in use for knowledge management today, ranging from simple e-mail methods to web-based systems for the Internet and intranets. The major purposes of this technology can be summarized as below:

- to support groups to work together and to manage their workflow

- to categorize, extract and otherwise manage information resources and “content”
- to manage relationships with clients
- to develop “portals” – web sites that provide more functionality and possibilities for interaction than “traditional” web sites.

Much knowledge management technology has been developed for the corporate, rather than the public or academic sectors. (See [Box 1](#)). The next section provides an introduction to key methods and technologies that are of particular relevance to health researchers and managers.

### Using electronic technology to communicate

E-mail and the World Wide Web are the two primary ways in which people can connect to information or to other people over the Internet.

See [Tools and Resources: an introduction](#) for:

- basic information for potential users of e-mail and the web
- basic information on setting up and participating in e-discussions

Electronic dialoguing and e-conferencing allow people in any part of the world to communicate and share ideas, information and news with one another. Communication can be asynchronous, taking place over many hours, days or even months, or can occur in “real time” at a set date and time. Both e-mail and web-based technologies can facilitate such modes of communication. Some common examples are given below.

### E-dialoguing

For many of these communication methods, discussion groups must be established and managed. The software required for this purpose and the basic issues involved are described in [Tools and Resources: an introduction](#).

Discussion groups may be of the following types:

- [open](#)
- [structured](#)
- [Internet Relay Chat](#)
- video and audio chat and web [telephony](#)
- [web](#) conferencing.

[Tools and Resources: an introduction](#) describes:

- list software for setting up e-discussion lists
- advantages and constraints of using moderated or unmoderated lists
- responsibilities of moderating a list.

### **Open discussion lists**

The classic use of an e-mail discussion list is simply to allow members to ask questions, receive answers, express opinions that arise spontaneously from their working lives, share information about anything – from their thoughts today to specific news about initiatives, meetings or project reports.

Discussion groups have great potential for education and community-building. Groups take on their own “personalities”, showing their focus; the energy with which discussions take place; the rate of response; the length of messages; the generosity of spirit or guardedness shown; promptness of replies as well as spelling, grammar and punctuation norms. Even when the same individuals contribute to different lists, the personalities of the lists may be very different.

A community is created by the very process of joining a group, being accepted (especially if the list is moderated), beginning a discussion and getting a reply. Over time, individuals determine whether or not a discussion group is relevant to their needs.

[Box 1](#) compares the use of lists in development work with how and why they are used in commercial companies.

#### **Box 1. Uses of lists in commercial enterprises and development work**

##### **Commercial company**

- to build a “user group” of people who are familiar with their products
- to allow company representatives, as well as more experienced laymen, to share information with those less experienced
- to build customer loyalty
- to provide customer support
- the sponsoring company can build an excellent reputation – and significant business – from discussion group members

##### **Development organization**

- to build a community familiar with the key concepts and policies in the subject area
- to allow the organization’s programme officers, as well as more experienced laymen, to share information and evidence with those less experienced
- to create consensus and communities of knowledge
- to help solve implementation problems by providing evidence-based knowledge
- the sponsoring organization can enhance its reputation, sell its ideas – and attract funding – among its target communities (implementers, donors, policy-makers)

### Structured discussion lists

Many lists sponsored by development organizations organize periodic “online conferences”. Typically, these are carefully planned, with a clear timeframe, and are generally broken down into a series of component subtopics which are discussed separately, each with its own prepared short paper or introductory statement. The moderator plays a very visible role in the discussion, stepping in whenever tempers rise or excessively combative language appears – or when it appears that everyone has gone to sleep (sending personal messages to individuals off-list to get them to comment). As such, an online conference moderator needs to be sufficiently knowledgeable in the subject area, able to exert authority as a mediator, and also have the capacity to enliven the proceedings. Conferences of this kind have been staged by many organizations (recent ones include the World Bank’s discussion of the role of civil society in the Global Development Gateway, and the Food and Agriculture Organization’s 12-week marathon on aspects of agricultural communication). [Box 2](#) presents some of the positive and negative experiences gained with e-conferencing.

#### Box 2. Positive and negative experiences with e-conferencing

##### Positive

- immediacy (rapid information exchange takes place in a short period of time)
- wider access to specialists and participants internationally than may normally be achieved with face-to-face conferences
- shared experience
- relatively low costs compared with normal conferences
- automatic archiving (where possible) simplifies production of post-conference synthesis documents
- tangible output available at end of dialogue (linking input to output)
- flexibility for participants with regard to contributing to debate

##### Negative

- time taken to read, digest and respond to contributions
- limited participation from particular target groups (e.g. World Bank) and “end users” (e.g. rural/urban poor)
- personalizing of particular issues or contributions may reduce the value of the contribution and diminish the value of the forum
- disruption of existing work schedule

(Source: Adapted from Saywell D (2002). *Electronic conferencing and on-line dialogue for development purposes*)

See Tools and Resources, [e discussion](#), for an illustrative example of how to launch an electronic discussion series.

### ***Internet Relay Chat (IRC)***

This is a multiuser chat system, where people convene on “channels” (a virtual place, usually with a topic of conversation) to talk in groups, or privately. It is distinct from both e-mail and web-based methods of communication. It provides a way of communicating in real time with people from all over the world. Conversations may be public (where everyone on a channel can see what you type) or private (messages between two people only, who may or may not be on the same channel).

Users enter text into a window in software resident on their own computer. When they hit the return key, the text is transmitted to the viewer or web site, where it becomes visible to others watching the page, who can then reply in turn. The sensation is very much that of having a conversation with a roomful of people, and the rules governing it are those of public speech – with the exception that people often seem emboldened by the lack of physical presence to say things which they would not say face-to-face.

In a sense, chat is like an unmoderated e-mail discussion list, but faster – as it is entered, it scrolls upwards, and vanishes. Generally, not many people see it at any given time, and chat need not be archived. Chat can also be moderated, of course, but this is rare. Usually it takes a specific reference to misbehaviour before miscreants are banned, but the damage they can cause is limited.

### ***Video and audio chat and web telephony***

Spontaneity of expression can be enhanced by providing a video stream and audio feed. For example, the fifth annual Global Learn Day (GLD) in 2001 was a 24-hour event in which selected persons from around the world (including the author of this unit) participated in a tightly choreographed global event for the benefit of anyone who chose to visit the web site. Such a use of the web is analogous to a video conference.

The same principle is applied in web telephony, where the local call to the Internet service provider (ISP) can result in the transmission of voice internationally, at the cost of a local call. The caller talks into a microphone attached to a device that converts the voice into a digital file. This file is transmitted on the Internet by web-telephony software to a specified recipient. When it reaches the recipient, the file is converted back into sound. Although the process is still characterized by noticeable lags and delays in conversation, it is much cheaper than an international telephone call, since both the caller and the recipient are only paying the cost of connecting to their local service provider, however far apart they may be geographically.

### ***Web conferencing***

Discussion forums can be run concurrently on the web and via e-mail. People can visit the conference forums on the web site and post responses or ideas. The e-mail list can receive messages posted on the web via e-mail. Thus the two input and exchange media can be made to work in tandem.

## How to improve e-conferencing

- Before the conference begins, plan ways of managing and using the information which will be obtained. Provide clear guidelines for participants outlining the specific format in which contributions during set phases should be made (this greatly reduces the time spent in editing outputs from the conference, such as synthesis documents, after the conference ends).
- Strike a balance between information exchange (such as provision of descriptive case-study material) and discussion of key themes (which requires more analytical input). There may be a tendency for information exchange to dominate, since it is relatively straightforward to provide. Hence, adequate time and encouragement must be given to abstracting lessons during the conference.
- Problems associated with unsubstantiated claims (i.e. where participants make statements without adequate referencing or justification) should, in part, be dealt with through peer review during the conference itself. They can also be reduced through guidance provided in the “protocol” document. In moderated conferences, the chairperson may screen out such messages.
- Our experience has found that it may take up to 48 hours for a message to be received in some parts of the world. E-mail connections in some countries are few and frequently interrupted. This has implications for the length of conference sessions, and may lead to messages being posted which are not relevant to that session.
- Participants need to be convinced that there is a clear incentive for them to participate in the event. Given the growing problem associated with “information overload”, it is important to demonstrate that tangible benefits (for example a high-quality output document) will be produced from the conference.
- Production and dissemination of the synthesis report from the conference may be neglected, or difficult to achieve once the conference ends. Proper allocation of time, budget and personnel resources to its production during the planning of the conference needs to be emphasized.
- Use of e-mail may be expensive in some countries with poor telecommunications infrastructure. It should be remembered that some participants will not enjoy institutional support for these costs, and may pay for incoming mail personally. Local nodal points may be set-up to relay the conferences.

## Using electronic technology to work together: the digital workspace

Health researchers and managers today face a variety of new challenges in their workplace and work processes:

- a diversity of work environments – multiple offices, home office, hotel rooms while travelling, different countries, different time zones

- collaborative involvement of groups and individuals who are widely dispersed geographically
- a need to have instant access to the most recent information on demand to meet immediate needs
- effective multitasking of roles and responsibilities across a number of different projects and commitments.

When you are working with partners in other departments or organizations, using the web or e-mail, you become part of a “virtual project team”. To be productive, such teams need to work together at least as well as they would in a traditional setting – and ideally much better.

### **What is a “digital workspace”?**

The term “digital workspace” is used to refer to a web-based work environment that allows individuals to communicate, collaborate and share information, regardless of their geographical location.

The technology that supports such digital work environments is commonly referred to as “instant groupware” – “groupware” because it facilitates collaborative team work while also supporting individual work, and “instant” because many applications offer a “straight-out-of-the-box”, ready-to-use set of tools requiring little set-up time or in-house programming.

There are a number of instant groupware products on the market. The names of some of them capture the notion of a virtual office – a cyber workplace. “eRoom” is one example. The names of others, such as “eProject” and “Project.net”, emphasize the work performed in a digital workspace – namely, project-oriented work. This distinction aside, the products tend to be similar in their user interface and the features they offer.

Digital workspace software allows you to develop a research project plan, improve communication between team members, keep track of projects and provide progress updates for managers and stakeholders, create a personalized workspace, work in the applications you know best and share work across boundaries.

Such software is generally easy to set up and use. It connects team members who are travelling, in different offices and behind different firewalls. The system itself lets you decide how to structure projects to fit your workflow. Digital workspace software should be compatible with existing software, and have an open, documented applications interface to allow integration and object exchange with other applications.

The best-known packages are eRoom (<http://www.documentum.com/eroom/>), eProject (<http://www.eproject.com>), and Project.net (<http://www.project.net>). Project.net supported WHO project management during the pilot phase of the Health InterNetwork (HIN) initiative, including projects in Africa, Central Asia, Eastern Europe, India, Latin America and the Middle East.

## ***Advantages of digital workspaces***

Digital workspace technology can enhance three key knowledge management functions: information-sharing, planning and organizing of work, and collaboration. Each of these is described in greater detail below.

**Facilitates information-sharing:** All project information and related files are centralized in a virtual “file cabinet” or “library” that is accessible on demand, 24 hours a day, to team members working from their home, hotel or office, using a web-enabled computer and a local connection to the Internet. Many individuals who travel frequently have already discovered the ease of sending and receiving information, as well as picking up their regular e-mail through the use of web-based e-mail accounts such as Hotmail or Yahoo. With a web-based workspace, project data and documents are accessed just as easily from anywhere.

Putting information in “one spot” creates a project archive that not only facilitates information sharing but provides an invaluable tool to support the development of organizational learning, as well as project review and overall management. Organizational memory is built up by archiving data and documents, as well as by bulletin-board discussions, poll results and bookmarks.

**Supports planning and organizing of work:** Features such as the calendar and task lists help teams to plan more effectively by encouraging identification of tasks, responsibilities and deadlines. Team members are able to “get the big picture”, both by following what others within a project are doing and by seeing how various projects within an organization or unit are progressing. This can decrease the need for face-to-face meetings, since it is easy to see where an initiative has got to. This is particularly important where teams are widely dispersed geographically and face-to-face meetings and teleconferencing are costly.

By keeping everyone “in the loop” about the status of the project and making the management of work explicit rather than implicit, individual and team accountability is improved.

**Enables collaborative work:** A real-time chat feature can support virtual meetings around focused topics, while bulletin-board discussions and regular e-mail allow team members to converse asynchronously with one another. Some products have a whiteboard feature that allows team members to draw diagrams collaboratively. All support multiple authorship of documents through the editing features of the source word-processing software.

## ***Sounds great! But are there any drawbacks?***

The various features (described in greater detail below) will be familiar to anyone with a moderate level of Internet experience. Even users with little familiarity are likely to get up-to-speed quickly. Users tend to experience difficulties not so much in learning to use the program features, but in learning to **work differently**.

Digital workspaces do require a change in work habits and organizational culture. For many individuals, e-mail has become their primary “inbox-outbox” for work that passes across their desk or through their computer. Although automatically-generated e-mail alerts and reminders are a feature of digital workspaces, the web

interface requires individuals to log on regularly to update themselves on the status of the project. The team member's individual home page or the project home page becomes a new (and in many cases an additional) "inbox-outbox." Also, the explicit management of work can create new accountability pressures: the program makes it easy for all to see at a glance who has done what and when. Users access the web interface on demand, which makes accessing project information and updates into a "self-service" facility. This can mean a change in work patterns for those accustomed to relying on others to place information in front of them. Additionally, the organizational culture must place a high value on collaboration and sharing of information.

Team members can become frustrated when there are different levels of comfort with or enthusiasm for using the technology within the team, thus leading to duplication of effort, or when they experience local difficulties in accessing the Internet. Strong organizational commitment and team "champions" for the use of the technology are needed. They must "lead by doing": they need to demonstrate to team members and at the unit or organizational level how the technology makes a difference to the work.

### Common features of digital workspaces

- **Home page:** Project home pages and individual team member (personal) home pages summarize new items as well as appointments, issues assigned and tasks to be completed. The project home page allows the viewer to learn at a glance what the latest issues are, what tasks are due, who has been assigned to them and the status of their completion.
- **Document management:** Document exchange and version management are supported by a central file repository or virtual "file cabinet" of project documents. Access to documents can be restricted to certain teams or team members. Documents are checked in and checked out, and all versions tracked. Documents may be locked to prevent changes being made to their content. Project documents may be linked to other project items. For example, the agenda for a meeting may be linked to the meeting entry on the project calendar. Clicking on the meeting entry in the calendar calls up a link to the agenda.
- **Bookmarks:** Bookmarks can be used to create a knowledge base or library of links to online resources, tools, articles, etc.
- **Calendar:** A shared project calendar and personal calendars keep team members apprised of important appointments and events. Agendas, minutes and discussions can be attached to calendar entries.
- **Tasks:** The Tasks tool allows team members to create, assign and manage tasks – from complex, multiphase schedules to simple "to-do" lists.
- **Automatic alerts:** Automatic alerts inform relevant team members of latest updates to the project and upcoming events and deadlines.

- **Discussions:** Real-time chat, discussion boards and regular e-mail allow team members to converse with one another and hold electronic dialogues about specific issues or problems.
- **Polling:** Makes decision-making quick and auditable. Team members can create a poll in minutes using customized response options. Formal approval procedures can be established by linking polls to a document or discussion.
- **Team Directory:** The team directory provides a list of project members and the contact information they have recorded in their profile.
- **Related Items:** Related Items permits team members to create links between project items, such as a calendar event and a document.
- **Search:** Team members can perform cross-project or project-specific keyword searches.

### Knowledge dissemination

This section provides an overview of electronic tools that facilitate knowledge dissemination, including:

- electronic newsletters
- CD-ROM and DVD
- electronic publication
- web sites
- web portals.

### Electronic newsletters

Electronic newsletters can convey news items, announcements and opinions (editorials). There are two types:

- an e-mail newsletter which consists of text only, uses very little formatting and no illustrations.
- a PDF Acrobat file or set of HTML web pages containing, essentially, a formatted electronic representation of a printed newsletter (with all the fonts and photos in place). It can be delivered by e-mail or accessed on a organization's web site.

### Uses of electronic newsletters

- Remind members about any policy or implementation issues discussed in the list, or about new information and features on the web site.
- Inform members about upcoming meetings and conferences and report conclusions arrived at in recent meetings. Often, such newsletters are also archived on a web site, creating an increasingly valuable information resource.
- Enhance the organization's reputation through occasional supplementary articles of interest.

- Nurture potential members The newsletter can be mailed both to members on the list, and to other persons as a promotional tool to encourage more participants to join the list.
- Solicit paid subscriptions when appropriate from nonmembers, offering proprietary information not readily available elsewhere, and thus earn revenue from paid sponsors of the newsletter.

### CD-ROM and DVD

The CD-ROM, not the Internet, is the dominant electronic technology today. Far more people have access to CD-ROM technology than to e-mail or the web. Every computer being produced today is equipped with one or more CD-ROM drives. Even in developing countries, CD-ROM use has been growing steadily since 1986, when the first commercially available disks were disseminated.

The next step up from CD-ROM, in terms of capacity, are Digital Versatile Discs (DVD). DVD players have become the fastest-growing consumer electronics product in history. This area is developing very rapidly, with variants such as DVD-audio, TV/DVDs and DVD mini-systems. DVD recorders using the DVD-RW and DVD+RW formats (which permit the writing and rewriting of digital files – whether text, still or moving image, or music) are expected to appear in the United States of America and Europe soon.

The portability, relative robustness and resistance to environmental conditions, and ever-increasing capacity of disk technology such as CD-ROM and DVD means it is capable of serving as a library on a disk, particularly in developing countries. [Box 3](#) describes two examples of the use of CD-ROMs in health.

#### Box 3. Two uses of CD-ROM technology in health

- a recent CD-ROM produced for the WHO Expanded Programme on Immunization (EPI) contained over 300 books, pamphlets, posters and training materials clustered around a basic EPI management manual, together with the relevant reader, search, browser and EPI software: this is really all the information support needed in this field
- the *ExtraMED* CD-ROM library has been issuing one disk a month containing the full text of 316 biomedical journals (Available online at: <http://www.iwsp.org/ExtraMED.htm>, accessed August 2004)

CD-ROM is inexpensive (barely US\$1 per disk for high-volume production, once start-up costs have been covered) and particularly suited both to the broad dissemination of collections of relatively unchanging materials and to the controlled dissemination of regularly updated materials to defined audiences. Ideally, each disk should be a stand-alone product and as self-contained as possible in terms of its contents and any software required to operate it.

## E-books and print-on-demand

E-books are texts that have been formatted in such a way that they are comfortably readable on the small screen of a hand-held device (PalmPilot or specialized e-book reader). Such texts can be downloaded from the Internet, received by e-mail, supplied on CD-ROM or diskette – or included as firmware in the reader at its point of purchase.

Print-on-demand technology and the associated business models have been around for many years. The idea is that you do not produce large print-runs of books, with the associated problems of shipping and storage, but rather print off copies as you need them – even one at a time. Since the shipping and storage of heavy, yet relatively fragile books is a significant problem in developing countries, print-on-demand has always been of interest.

With the marriage between this technology and online media, texts held in digital format can now be transmitted through the Internet to print-on-demand machines in remote places. The new print-on-demand machines are small, and capable of quickly printing and binding professional-quality books in both black-and-white and colour. This has revolutionary potential for transferring information to developing countries.

## The web site as a knowledge warehouse

In a modern network or organization, the role of the web site is crucial. Its principal value lies in providing a warehouse of knowledge and resources. In providing resources on a web site, there are two key strategies: information aggregation and information mediation.

### *Information aggregation*

A web site provides access to a virtual collection of files containing books, journal papers and other published information. These files may be resident on one or more network servers. The user accesses them from a single web site, hence it will appear that the files are all local to the site, rather than resident on other sites.

Critical issues facing those responsible for aggregating material and making it available are:

- file formats that are feasible for access in countries that do not have high-speed high-bandwidth access to the Internet
- rights and copyright to materials
- access control.

**File formats:** While network members in industrialized countries will generally have high-speed, high-bandwidth access to the Internet, those in transitional and developing countries will typically have slow, low-bandwidth connections. In such cases, full-text information should be placed on the site in two formats: open formats, using nonproprietary file structures such as text (.txt) or tagged text (.html or .xml), which permit searching and low-bandwidth access, and encoded formats, such as Acrobat (.pdf), that allow the retention of page layout, graphics and all the formatting that exists in the final printed version.

The reasons for this are: (1) open full-text can be picked up by search engines, whereas PDF files only provide the name of the file for searching (unless a .pdf index file exists); (2) PDF files must be opened before they can be searched at the site, while open text can be searched right away; (3) PDF files require sufficient bandwidth and connection speed to make them worth opening – many developing-country users will simply not be able to open or even download large .pdf files locally. Thus, the recommendation is always to use both formats.

**Ownership and access control:** Much more than in the paper world, digital aggregations are plagued by the question of who owns the rights to the materials included on the site, particularly their copyright. The answer will determine what systems of access control need to be established. In the case of information provided by an external publisher or other rightsholder, an organization or network would need to negotiate to secure a licence (paid or free) for the use of the information. Such licences define the rights of use by participants in the network and spell out access conditions that may be offered. For example, they may stipulate password-protected access, or provide for free access to network members from a defined set of countries with paid access for the rest, and so on. Clearly, there are managerial, cost and technical overheads implied in providing such information at the network server.

Taking on the role of aggregator also implies keeping an eye on versions, corrections, replacing old with new, and the like. The benefits of aggregation are that you can always be sure of exactly what you are offering to the network. The drawbacks are the licensing, file-format and access-control issues mentioned above.

### **Information mediation**

Unlike information aggregation, information mediation has no practical counterpart in the real world. With mediation, the text files themselves can be located anywhere, on any server. Users of the network typically use local resources (indexes or databases of concepts) to search for valid information, and then reach the texts themselves by following links (as URLs or Digital Object Identifiers – see <http://www.doi.org/>).

This methodology is clearly easier to administer, as the responsibility for managing the content (including copyright, access and licensing arrangements) lies with the remote site. Nevertheless, a significant administrative burden remains in identifying and contacting the sites to which you link, creating and managing the indexes and identifying and repairing broken links when the URL of a full-text provider changes. There is little scope to control file formats (as you have to use what is served up by the full-text site, and rarely have any scope to modify it).

### **Putting your knowledge assets on the web**

Most web sites use a combination of information aggregation and information mediation strategies. Information or knowledge aggregation can be internal to the organization, bringing together its own knowledge assets and thus avoiding some of the problems described above. [Box 4](#) offers some suggestions on putting your organization's knowledge assets on the web. [Box 5](#) provides some tips on

disseminating high-quality health information which are readily applicable to other contexts in which information is disseminated.

#### **Box 4. Putting your knowledge assets on the web**

##### **Knowledge asset audit**

Conduct a knowledge asset audit to identify in-house resources that you can use on the Internet. Here are some steps to follow:

1. **Gather** staff and anyone else who has, or knows of, organizational knowledge assets.
2. Brainstorm a list of all the **information resources and knowledge** that exists within the organization.
3. Look at your **goals** for using the Internet and your intended audiences.
4. Decide which of these assets are the **most important** – designate those as priority assets.

##### **Typical knowledge assets that can be developed as Internet content**

1. **Brochures, print documents and campaign/programme materials** can easily be converted into regular web (HTML) pages and used as news headlines and teasers.
2. **Photos, charts, maps, graphics and cartoons** can be converted to digital formats for effective communication.
3. Use multiple **languages** when necessary on the site.
4. Calendars: display **event information** for easy access.
5. **Links** to other sites: offer a directory of online resources that makes your web site a popular destination for researching issues.
6. **Searchable online databases**: build an online repository of information that can be searched on the web.
7. **Audio and video streaming**: good for putting up short videos or audio samples such as public service announcements (i.e. noncommercial advertisements), media interviews, organizational videos, conference workshops and plenaries.
8. **Web discussion forums**: create an online space for discussions among people with similar interests.
9. **Search engines**: once your collection of web documents exceeds 50 items, install a search engine to improve ease of access.

##### **Convert and maintain your assets in digital form**

1. Focus on **priority assets** that relate directly to your core audience needs.
2. Determine what **technology costs** are associated with a particular knowledge asset. Will it cost money to convert VHS videotapes to digital form? Will your monthly web hosting fees increase if you host an online database? What are your monthly costs to run an online advocacy system with a directory of legislators?
3. Determine what **staff costs** you will incur with a particular knowledge asset. Will you have to hire a technology consultant to help you put a database on the web? Will you have to dedicate existing staff time to scanning maps and photos into digital format? Will more staff time be needed to maintain your web site and send out a regular e-newsletter?
4. Develop **task forces** around specific assets or assign an individual to handle the asset.
5. Break things down into **smaller chunks**. For example, if you determine that the old issues of a print newsletter will be great to post in HTML on your web site so users can use a search tool to find relevant information, then develop a schedule to get these online. Will you put up one old issue per week or per month? Look at the calendar, develop a realistic schedule and keep to it.

(Adapted from: Stein & Osten, 2001)

### **Box 5. Disseminating “hi quality” information on the web**

Hi Quality (<http://www.hfht.org/hiquality/default.htm>) was launched in February 2002 by the Centre for Health Information Quality – a United Kingdom development agency for producers and providers of health information – with funding from the United Kingdom Department of Health. It was developed with the help of a consumer focus group which provided overall direction for the site.

High quality health information should be:

#### **Accurate**

Information should be up-to-date and sources of evidence stated.

1. Always specify the evidence **source**
2. Always **balance** the evidence – use a combination of patient opinion and expert research/opinion
3. Always ensure that the evidence is **up-to-date** and **current**.

The information should: be presented in a consistent style (information does not contradict itself, design and layout are consistent); be presented in context with other resources, be up-to-date (showing the date of production and an expiry or review date).

#### **Clear**

To produce clearly communicated information, you should consider the following.

1. **Format** – is the information being communicated in an appropriate way?
2. **Content** – what exactly is being said?
3. **Language** – is the style appropriate?

#### **Relevant**

This means that the information is developed with consumers to ensure that it is appropriate to their needs.

The information should be accessible and appropriate (with a clearly defined target group, stating the aims of the resource, signposting other formats of this information, if applicable). Images should relate to the content and be clearly labelled.

The information should be based on the best available evidence. It should state its aims and relevance, its sources and the date of production. It should be presented in a well-balanced manner, signposting other resources, and should disclose areas of uncertainty.

## Web portals

A portal is essentially a web site that:

- operates either as an open Internet site, or as a closed site for members only, or on an organizational intranet
- provides a gateway to significant resources, whether aggregated on the site or linked to on other sites
- allows users to share information and interact
- carries the ability for personalization (so that users can set up their own MyPortal pages)
- enables collaborative working.

A web portal combines the functions of “data warehousing” (compiling large databases that have certain additional capabilities) and “data mining” (extracting the data you need from a data warehouse).

The main differences between portals and data-warehousing applications are that portals integrate content management systems; emphasize the exchange of data with external data stores and applications and the sharing of data and information among users; strongly implement data mining and analytical applications and, above all, integrate numerous different applications and data sources into a single, integrated, portal application.

There are many kinds of web portals. The principal category recognized in knowledge management is the “enterprise information portal” (EIP) and the subcategory of “enterprise knowledge portal” (EKP). EIPs include technologies such as imaging and scanning; document management; work flow and groupware; computer output to laser disk (COLD) storage; business process automation; key word, phrase, or concept-based searching and text mining (including the use of intelligent agents to optimize the focused acquisition, retrieval, analysis and transmission of content); object-oriented database management systems (which integrate database capabilities with object-oriented programming language capabilities); video streaming.

There are many products available, including software which is general purpose (e.g. Autonomy, CleverPath, Microsoft’s SharePoint Portal Server , Viador), specific for content management and text processing (e.g. Autonomy, Collexis, Plumtree, Semio, Tacit), or geared to management, storage and analysis of structured data (e.g. CleverPath, Scribe, Viador).

## Reaching the end-user

Audiences for health information identified during a WHO meeting demonstrate the breadth of the target audience – from politicians and civil servants, academics and researchers, to practitioners at all levels in the public health infrastructure (from central services to community-based services), and right down to the general public. Each category requires information and knowledge tailored to its needs. This is true throughout the world, and is a particularly significant issue in developing countries.

The challenge is how to bring together global and local knowledge, and make it accessible to such audiences. A number of initiatives are working on this, some focusing on bringing external information into the local sphere and adapting it to make it locally appropriate. Others are strengthening the capability of local information to be recognized and operate locally and to participate in the international flow of information. Still other initiatives focus on making huge collections of formal health information available.

#### **Box 6. Target audiences for health information**

1. Policy-making levels in the Ministry of Health
2. Health professionals with university training
3. Health professionals with full, normal training but not university-level
4. Policy-making levels in the government
5. Professionals in health-related fields with university training (managers, accountants, nutritionists, etc.)
6. Technicians in various fields
7. Paramedics, health technicians
8. Health auxiliaries
9. Traditional birth attendants and traditional healers
10. Other auxiliary staff, community workers and local nongovernmental organizations
11. Community leaders (religious, social leaders, teachers, etc.)
12. Public opinion leaders (including social writers)
13. The educated public (secondary-school level and upwards)
14. The general public (including village communities, etc.)

(Adapted from: World Health Organization Regional Office for the Eastern Mediterranean, unpublished report number EM/PUB DOC/4, 1984)

## **Locating information**

### **Concepts governing electronic searching**

With some three billion top-level pages and 500 billion pages in databases on the web, there will always be too much retrievable, relevant information and knowledge. This is why there is such a strong emphasis on software that can carry out the trending, visualization and analysis of retrieved results.

Three of the approaches to electronic searching are:

- Boolean searches
- keyword-based technologies
- concept-based technologies.

**Boolean searches** For a generation, the most expert forms of searching have involved applying Boolean operators (AND, OR, NOT) to keywords. Boolean searches on keywords rely on the searching skills of the individual. This means that some individuals can find what they are looking for with greater ease than others. Such skills do not necessarily relate to the training and intelligence of the searcher. In general, blind luck plays a major role in most efforts at information resource discovery – particularly if one does not have a previous reference to start from.

**Keyword technologies** Keyword technologies used by online search engines such as Google, Yahoo, Lycos and Altavista involve the user typing a single word or several words into a search field in order to try to locate relevant information. The results are typically a mass of “hits” – references containing the word(s) in the search field. These can be presented either wholly unsorted, or with some effort to place those references that contain more instances of the word(s) at the top of the hit list. The Google search engine uses the link structure of the Web as an indicator of an individual page’s value. Google interprets a link from page A to page B as a vote by page A for page B, analyses the page that casts the vote and uses this information for ranking. According to Google, this is a way to find web pages that are both “important and relevant” to a search. This makes Google probably the most successful of the keyword-based search engines. Incidentally, it is worth noting that, unlike Google, many (if not most) search engines on the Internet accept paid ranking. Companies pay to have their link shown towards the top of a results page. Thus, the order in which the entries are presented may have no direct bearing on their intrinsic relevance to the search. This makes most search engines of doubtful value as research tools.

**Concept-based technologies** Concept-based search technologies work by identifying the concepts in a text and searching for them. For example, the text may write about a “woman with her child”, without using the word “mother”. Concept based search technology is able to extract the concept “mother” from the words “a woman with her child”. This is done in different ways by different software. Some extract concepts by using a thesaurus to link terms to concepts (e.g. Collexis software), probability techniques to count frequencies of association of similar terms (e.g. Autonomy) or semantic methods to analyse patterns of word use (e.g. Semio). Such technologies are much more powerful in finding and matching texts than the older keyword-based search technologies. Typically, the user pastes in a piece of text – it can be several paragraphs long – and the software provides a list of results ranked in order of relevance. You can try this out on the Internet if you visit the Alliance for Health Policy and Systems Research web site at <http://www.alliance-hpsr.org> – Services – Search the evidence base.

There are currently only two categories of genuine concept-based search technologies – the vector- and thesaurus-based software of Collexis (<http://www.collexis.com>)

(see [Box 7](#)) and the Bayesian statistical methodology employed by Autonomy (<http://www.autonomy.com>), Semio (<http://www.semio.com>) and Microsoft's SharePoint Portal Server (<http://www.microsoft.com>) (all accessed August 2004).

### **Box 7. IKON indexing and conceptual searching**

IKON indexing and contextual searching software is distributed by Collexis BV, Netherlands. It is the basis for the SHARED health research project (<http://www.shared.de>).

IKON can be applied to content of any kind in electronic files of virtually any standard format. If you pass text through IKON, it will extract the concepts in that text and store them in a very small index file called a "conceptual fingerprint". A list of concepts is thus created for a given text, together with a weighting which denotes the relative importance of each concept in the text.

In checking the text, IKON uses a **thesaurus**, to determine, for example, that the terms "woman" and "child" are linked by the concept "mother". The largest thesaurus available in the health/medical field is the Unified Medical Language System (UMLS) with 920 000 distinct medical concepts identified by 2.8 million terms from over 50 medical vocabularies and classifications. IKON also uses other thesauruses as appropriate.

The weightings in the fingerprint are calculated according to three key indicators.

- **Frequency:** how often the concept is listed in the whole document – a concept is probably more significant if it is referred to frequently.
- **Specificity:** how specific the words in the text are for this concept, based on their appearance in the associated thesaurus – a concept is considered to be more significant if it contains a term that is rare in the vocabulary. When matching fingerprints, concepts identified as being specific in this sense are weighted more heavily than nonspecific concepts. This second weighting for specificity is not stored within the fingerprint, but is computed dynamically during the matching process.
- **Similarity:** how well the concept term matches the phrase – a concept is probably more significant if it is included completely in the text, e.g. if you find "general practitioner" in the text and the nearest concept found in the thesaurus is "general practitioner system", the similarity would be around 0.7.

Both categories inevitably have points in common, as they are both concept-based. However, one significant difference between them lies in the former's use of thesauruses such as the Unified Medical Language System (UMLS) (<http://www.nlm.nih.gov/research/umls/>). Autonomy, on the other hand, focuses on what is essentially a "brute-force" mechanical/mathematical operation. The thesauruses used by Collexis provide the human input to the technology, enabling it

to benefit over time from advances in the human understanding of how concepts are related – without, however, being trapped in the past. Although both Collexis and Autonomy rely on sophisticated mathematical strategies, Autonomy is inevitably tied to its algorithms and not to the evolution of information and semantics, or to the relativistic and time-based nature of knowledge. Collexis is the technology powering the SHARED project (<http://www.shared.de>).

### Gaining access to content

Another barrier in locating knowledge is getting access to it once you have found it. This can be a problem, particularly in developing countries where access to journals and other publications can be limited. The rise of so-called “open access initiatives” and multipublisher sites offering low-cost, or free, content is an important step towards addressing this problem using information and communication technology.

The definition of “open access” ranges from completely free access to journals and “pre-prints” on the Internet, to schemes providing “affordable” access to some categories of users (usually favouring developing countries) under specified conditions.

A list of the principal affordable or open access initiatives is provided in Table 1. A fuller description of several of these is provided in the section [Tools and Resources: for everyone](#).

**Table 1. Principal initiatives offering free or affordable access to significant holdings of online journals and other health information**

Initiative	Location	URL (accessed August 2004)	Content offered	Who can access and at what cost?
Bioline International	UK and Canada	<a href="http://www.bioline.org.br/">http://www.bioline.org.br/</a>	43 journals; books, newsletters, symposia, reports, databases	Much of the content free, the rest at subscription price.
BioMed Central (BMC)	UK	<a href="http://www.biomedcentral.com">http://www.biomedcentral.com</a>	Over 50 online journals published in UK	All content is free of charge to all users.
British Medical Journal (BMJ) Publishing Group	UK	<a href="http://www.bmj.com">http://www.bmj.com</a>	23 specialist journals plus the <i>BMJ</i> and the <i>studentBMJ</i> published in UK	All content is free of charge to all users.
CAB International	UK	<a href="http://www.cabi-publishing.org/">http://www.cabi-publishing.org/</a>	46 journals; books, reference works, newsletters, databases published in UK	Some free indexes, the rest at subscription price.
Electronic Information for Libraries (eIFL)	UK and Netherlands	<a href="http://www.eifl.net">http://www.eifl.net</a>	over 5 000 journals (of which about 400 published in UK) and other content	Content provided to/through libraries according to the terms of a national site licence

Initiative	Location	URL (accessed August 2004)	Content offered	Who can access and at what cost?
Electronic Journals Library	Germany	<a href="http://rzblx1.uni-regensburg.de/ezeit/">http://rzblx1.uni-regensburg.de/ezeit/</a>	8 465 titles on all subjects	1 769 journals provide full text articles for free. The rest provide either full text articles for users of a member library on the basis of a subscription, or tables of contents and abstracts only (generally available free of charge)
HighWire Press	USA	<a href="http://highwire.stanford.edu">http://highwire.stanford.edu</a>	393 journals from over 100 publishers (some UK)	Most of the journals require subscription, although 380 677 articles (out of a total of 1 113 239 articles) are free.
Health InterNetwork Access to Research Initiative (HINARI)	Switzerland	<a href="http://www.healthinternetwork.net">http://www.healthinternetwork.net</a>	1 400 journals (of which about 400 published in UK)	Online access to users at a price depending on their country: generally free to users from developing countries.
International Digital Electronic Access Library (IDEAL)	USA	Now incorporated into Elsevier's ScienceDirect: <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a>	310 journals (some UK)	Online access to users at a price depending on their country: generally free to users from developing countries
Programme for the Enhancement of Research Information (PERI)	UK	<a href="http://www.inasp.info">http://www.inasp.info</a>	7 000 (of which about 400 published in UK)	Free or differentially-priced countrywide access licenses in developing countries, available to researchers and librarians
PubMed Central (PMC)	USA	<a href="http://www.pubmedcentral.nih.gov">http://www.pubmedcentral.nih.gov</a>	67 (of which 56 are from Biomed Central)	Access free to all content, to all visitors to the web site
The Scientific Electronic Library Online (SciELO)	Brazil	<a href="http://www.scielo.org">http://www.scielo.org</a>	200 journals (all Latin America and Spain)	Mostly free access to all visitors to the site. Some content only available by subscription.
Scholarly Publishing and Academic Resources Coalition (SPARC)	USA and UK	<a href="http://www.arl.org/sparc">http://www.arl.org/sparc</a> <a href="http://www.sparceurope.org">http://www.sparceurope.org</a>	19 journals and projects	Some free access. Most content only available by subscription, although at lower price than comparable journals.

See [Tools and Resources: for everyone](#), section 4, for further information on open access initiatives

## Knowledge generated in developing countries

Health researchers in developing countries face special challenges in disseminating information. For example, a health researcher may write up her research and publish it in a local medical journal. Such information may be read by colleagues in the country and used as evidence for further research, but such local journals are often circulated in quite a limited manner, and consequently the research remains unknown to the academic community at large. This was the case with some of the earliest case reports describing the incidence of HIV/AIDS, which were published in local journals.

Technology is spreading to local journals as well, through such projects as *ExtraMED* and *SciELO* (see below). Major indexing services are slowly opening their doors a little wider to local journals, recognizing that there is value in them. In these ways, local journals, and thus the researchers writing for them, are increasingly able to make an impact on the international community of researchers.

The alternative outlet for developing-country researchers is to publish abroad. However, not only is this often difficult, owing to the explicit or inherent biases in academic journal publishing but, even when it is successful, this can have the paradoxical result of depriving other local researchers of the knowledge, as such journals are expensive and otherwise difficult to obtain locally.

## The Internet and developing countries

### Internet resources of special interest to developing countries

With the rise of the Internet as a primary publishing medium, research is being published directly online, without an intermediate paper version. Developing-country researchers who have Internet access are increasingly taking advantage of the ability to contribute their papers to publicly accessible pre-print servers, and to participate in such “no-barriers” new publishing initiatives as BioMed Central (<http://www.biomedcentral.com>, accessed August 2004).

See [Tools and Resources: for everyone](#) for information on e-journals of particular interest, namely:

- ExtraMED
- SciELO
- Bioline International
- African Journals OnLine (AJOL), published by INASP

## Improved access to the Internet in more remote locations

### Telecentres

Scott Robinson, a Professor of Anthropology at the National Autonomous University of Mexico, defines a telecentre as “an institution providing public access to the Internet and other telecommunications services (telephone, fax, photocopying) in small, and usually marginal, places” (Robinson, 1999: 9). Commenting on the situation in Mexico, he goes on to say that:

“Establishments of this kind ... have had several purposes: not only to provide a source of low cost communication through the use of evolving digital technology but, more importantly, to serve as a catalyst for constructing a digital database of information to be used by local officials and citizens for public matters. Thus the Mexican telecenter initiative is only partially about computers and Internet connectivity. Its principal focus is on information policy – the availability and use of public domain information to strengthen participation in public policy debates, improve municipal administration and resource management, and create new opportunities for learning.” (Robinson, 1999:1)

Reviewing initiatives in Africa, Peter Benjamin notes that discussion on telecentres is always confused by the fact that the word covers different types of projects, and because many other terms have been used to describe telecentres. Following work by Mike Jensen, he distinguishes two specific types of telecentres:

**1. Small, private-sector telecentres (“microenterprise telecentres”)** Essentially, these are small phone shops run by small entrepreneurs and are generally quite successful, as they are run commercially in response to market demand. Typically, such centres start by offering basic telephone services, but then move into fax and Internet services as the market develops. “The small business centres have been very successful in some countries, and they require a supportive environment consisting of a legal system, taxes and helpful telephone operator[s]. Some are starting to move beyond telephony into information and communication technology (ICT) services but only when there is an economic demand; local content creation is unlikely. They increase access to the Internet and ICTs, but primarily only for those who can afford rates that are out of reach of the majority of the population. The majority of the centres are in the main cities such as Dakar and Nairobi. There usually is no explicit commitment to wider developmental goals.” (Benjamin, 2000)

**2. Bigger, donor-funded telecentres** “The main program has involved a partnership – between the International Telecommunications Union, UNESCO, and the Canadian International Development Research Centre (IDRC) – that has established major centres in Mali, Uganda, Mozambique, and South Africa. These centres tend to be much more expensive (up to US\$250 000) and offer a range of telephony, computing, Internet and information services. The projects stress community participation and sustainability, but to date none have proved that they can be self-sustaining after external funding. Most of these centres are supported by foreign donors, though the national programs for telecentres in South Africa and Egypt can be included in this category.” (Benjamin, 2000)

Benjamin draws the following conclusions.

- Centres are managed better when the owners have a stake in them. The entrepreneurial instinct is a strong force in making a centre effective.
- There is a great demand for telephony. ICT use can be built, but it takes time, training, and local adaptation.
- Simple business models are more likely to be successful than complicated ones. The idea of a multipurpose telecentre is ambitious. Without extensive training and support, many of the wider aims of telecentres are difficult to accomplish.
- Computers by themselves are not an information service. Few centres use information technology systems to provide information for local use.

The small telecentres have shown there is a greater demand for telephony than had been thought, and there is a growing market for information and communication technologies. The larger centres have shown that these technologies can be of use in rural areas, but currently they are not economically sustainable.

### **Information Waystations and Staging Posts: electronic-print chaining**

The Information Waystations and Staging Posts initiative provides a number of examples of ways in which knowledge networking can be applied in formulating large collaborative projects.

In 1994 and 1995, the *British Medical Journal* hosted international meetings on the dissemination of health information to, from and within the developing world (Godlee et al., 2000). One of the direct results of the second meeting was the creation, in 1997, of INASP-Health (<http://www.inasp.info/health/>), a cooperative network for organizations concerned with improving access to reliable information for health professionals in resource-poor countries.

Since 1998, INASP-Health has managed the Health Information Forum (HIF), a regular series of meetings bringing together almost all the organizations interested in health information. Right from the start, the forum's participants considered technological options in getting health information to health workers in developing countries. The challenge was to develop a coherent, cost-effective approach. An e-mail list was used to extend the discussion as widely as possible (over 2 000 messages were sent), and gradually two concepts arose:

- Information Waystations, which are local points of access to health information received electronically; and
- Staging Posts, which act as "relay stations", translating and adapting information materials in order to make them locally appropriate.

Thus, Information Waystations are concerned with bringing the technology to developing countries and training people how to use it to obtain health information, while Staging Posts focus on adapting the information materials received in such a way as to make them more appropriate for local use.

The results of this online networking were presented to the Health Information Forum at the Royal College of Physicians in September 1999. That meeting proposed that an initial needs assessment should be carried out. This was done by means of a questionnaire sent out by regular mail, by e-mail and on a web site between January 2000 and May 2001. The results were published as the *Global Directory of Health Information Resource Centres* (Available at <http://www.iwsp.org>).

The next stage, in July 2001, was to create the Information Waystations and Staging Posts Network by linking the 550 centres in the directory which have e-mail addresses. The network aims to:

- validate and maintain the data submitted to the directory
- express the health information and ICT needs of its members
- act as a conduit for support to members from donors and development organizations
- act as a medium for research into health information issues
- act as a memory bank and evidence warehouse for best practice in health information
- provide information mediation services.

At the time of writing, the project is set to enter into its next phase in two regions, where the Information Waystations and Staging Posts methodology will be used to provide distance learning and continuing medical education.

### ***The Open Knowledge Network: local content creation and exchange***

The Open Knowledge Network (OKN) (<http://www.openknowledge.net>) arose from work done between 2000 and 2002 by the Digital Opportunity Task Force (DOTForce) set up by the Heads of State of the G8 countries. Representatives from government, civil society and the private sector in both developed and developing countries worked on a wide range of initiatives to help bring digital opportunities to the South. Among these initiatives, the creation and exchange of local content was identified as the keystone of any bridge to be built across the digital divide. Without appropriate local content, users could arrive at community access points only to find little of relevance to their lives, almost nothing in their own language and few ways to use this new technology to increase their chance of an improved livelihood. The Genoa Plan of Action, adopted by the G8 Summit in Genoa, Italy in 2001, therefore called for a “national and international effort to support local content and applications creation” that would in particular:

- “encourage networking of bodies which acquire, adapt and distribute content on a non-commercial basis
- “encourage governments to provide widely-available free-of-charge access to state-owned information and local content, except where it is private or classified

- “encourage commercial publishers to explore possible business models to enhance greater accessibility for poor people to relevant content.” (OKN, 2002:2).

The consultation process began under the chairmanship of OneWorld International (the civil society DOTForce delegate from the United Kingdom) with support from the United Kingdom Department of International Development. Workshops and open meetings were held in the United Kingdom, Japan, Tanzania, Cambodia and India, with key participation by the MS Swaminathan Research Foundation, Accenture, International Institute for Communication and Development, International Development Research Centre, Harvard Law School and many others. Draft documents were posted on a number of sites and introduced to mailing lists, in order to develop the ideas being proposed. Discussions were enriched by new, linked working groups on local content set up by the United Nations ICT Task Force and the World Economic Forum.

What emerged from six months of consultation and research into existing best practice was a proposal that came to be called the “Open Knowledge Network” (OKN). The purpose of the network is to promote both the creation and the exchange of local content as widely as possible across the South. Local content development is closely tied to human development, and the ultimate goal of the OKN proposal is the empowerment of local communities.

The content – text, audio, video – will be held in digital form, to enable it to be shared through networks. For such local networks to flourish, one of the critical challenges is the development of local capacities. The network is not a fixed model, but should best be thought of as a framework or dynamic to link and support information initiatives among poor and marginalized communities through shared standards and values: local content, local people and local languages.

A first pilot project was launched in southern India in February 2002, in close collaboration with the Information Village Research Project run by the MS Swaminathan Research Foundation. The results were presented to a group of expert practitioners at a workshop held in Chennai, India in May 2002.

The following key concepts are included in the Open Knowledge Network.

- Connect to the Internet without going online, using local public access points/telecentres to upload or download information in short, inexpensive bursts.
- Focus on content, not technology, which is always changing. The forms best adapted to one Southern context may be inappropriate in another.
- Agree on using standards for exchanging digital content worldwide.
- Create a network of knowledge workers and translators across the South.
- Use a network of knowledge hubs to support the local access points.
- Encourage circulation of works which Southern users can afford to buy, while still allowing them to profit from their own contributions to the knowledge base. This will require an “Open Knowledge Licence” for proprietary material,

including the rights to copy, modify and translate information, to offer it for public distribution among network members, and to circulate it further in nondigital formats, such as hard copy, radio broadcasts and community bulletin boards.

- Encourage a market for local information, while maintaining the principle that knowledge for development should, wherever possible, be free at the point of use in poor communities.

## Tools and resources: an introduction

### 1. Basic information for potential e-mail and web mail users

#### Basic hardware requirements

The simplest method of gaining access to both e-mail and the web requires only a computer and a telephone connection. The telephone connection is needed to dial the telephone number of an Internet Service Provider (ISP). There is now at least one ISP in every country in the world. The ISP achieves the link to the international network known as the Internet. Thus, all that the end-user in the country needs to have, and to pay for, is a telephone call within the country, often as a local call within the city. Users need access to a computer and a device to link the computer to the telephone system, called a modem (which may be built into the computer or may be a separate external device). Increasingly, e-mail and web access can be obtained using a broadband connection over a standard telephone line or another network, such as cable television.

Although both e-mail and web mail use the Internet, it is important to distinguish between the two. When they are required to carry data rather than voice, telephone links can be slow or fast, continuous or erratic in their connection, and carry high volumes or low volumes of data (that is, have high or low bandwidth).

- For e-mail, a relatively slow, erratic and low-bandwidth connection will suffice.
- Web access demands a faster, more stable and higher-bandwidth connection.

This is a key difference in terms of systems requirements of the connected computer.

The other key difference lies in the software used.

- For e-mail, there are many, generally free-of-charge e-mail client software packages that enable messages to be sent and received.
- The web is based on using browser software (again generally free of charge) that interprets data according to a computer language in which text, images and sounds are tagged. The system requirements of the computer running a browser are much higher than those needed for e-mail. This is true even when one uses the “slimmest” browsers and the bare minimum of options (e.g. switching off the ability to see images and other items that require high bandwidth).

There are techniques for using e-mail to access resources that have been placed on web sites, but generally the worlds of e-mail and the web are very different. Everyone who is able to access the web can access e-mail, but not vice-versa.

## 2. Setting up and participating in e-discussions — basic information

E-mail enables individuals to send and receive messages either one-to-one, or one-to-many. When I address an e-mail message to several individuals using the “To:” and/or “Cc:” fields, I am effectively creating a small list. Each person receiving the message can reply to me by using the “reply” button or can reply to all by using the “reply to all” button. Most e-mail software allows you to create such group lists and give them a name, so that every time you want to send a message to a particular group, you simply type the name of the group in the “To:” field, rather than entering all the e-mail addresses one by one.

This is the principle of an e-mail discussion group, or list. All those who participate in the list submit their e-mail addresses to a list manager (or to automated list management software). Whenever they send an e-mail to the list address, all members of the list receive the message.

In theory, e-mail discussion lists can be as large as the population of the Internet. In practice, technological constraints make lists with more than 10 000 participants particularly demanding of resources.

The other natural limitation on list size is number of messages sent and received — the “traffic” on the list. Individual preferences and tolerances vary, but a list that produces on average one good message a day is generally better appreciated by the list members than one which annoys them by sending them 30 messages a day. Clearly, list members will put up with more messages when they form an intense discussion that is focused, on-topic and substantive. There is a tolerance threshold even there, however, and thus traffic volume is a crucial issue that needs to be taken into consideration.

To keep the number of daily messages from the list under control, lists usually offer an automated “digest” feature. Instead of receiving the messages one by one, those who have opted for the digest version receive all messages compacted into a single daily message.

List information can be stored either locally on the server or on any computer participating in the list, or in an archive on the Internet. This has implications for intellectual property which need to be known and agreed mutually by all participants. Such archives may be accessible only to list members, typically by using a password, or may be open to all visitors on the Internet. In the latter case, information shared in a membership-controlled list suddenly faces exposure to the whole world.

It is important for legal and social reasons that every participant in a list is aware of the laws, rules, protocols and conditions that govern the list, as well as standard questions of net etiquette, or “netiquette”. For this reason, each e-mail discussion group has a standard document covering all these issues, which is sent to new members when they join the list.

## 3. List software

There are three types of mailing list software in wide use today: Listserv, Listproc and Majordomo.

All operate similarly, in that they maintain lists of subscribers and forward mail received to all subscribers. When you subscribe to a list, your name and e-mail address are automatically added to the list. You receive a standard letter of welcome (via e-mail) telling you about the list. From that time on, you receive all mail (postings) sent to the list by its members. You may follow the discussions silently or join in. If you respond, you can send your response to the list (in which case, all members of the list will receive it), or to an individual on the list. You can sign off (unsubscribe) from a list at any time. You can also get a listing of all the members of a list and their e-mail addresses.

All lists, whether moderated or unmoderated (see below), require management – for example, one list of 8 500 names has about 200 “subscribe” and “unsubscribe” requests to process each week.

There are thousands of e-mail discussion groups in existence, many of them included in the largest “lists of lists” (e.g. <http://www.liszt.com>, <http://www.tile.net>).

#### 4. Establishing and managing unmoderated and moderated lists for e-discussions

E-discussions can be organized in unmoderated or moderated lists. Unmoderated lists function successfully on the basis of simple, mutually agreed rules, and leave all issues of traffic control to the software. There is no one “in charge”, and whatever people write is distributed to all on the list without any control or censorship.

An **unmoderated** list is **good** if:

- there are unlikely to be any problems with the nature of the content that is posted and the subject is narrow and focused
- the list is small (less than 50 persons) and its life-span is likely to be short.

It is **bad** if there is a chance that messages might:

- offend the social, moral or ethical principles of those on the list
- contravene laws (copyright, typically, but also data protection, incitement to crime, treason, divulging of trade or state secrets)
- be simply wrong, stupid or irritating.

Unmoderated lists are usually perceived to be highly democratic, as coordination is decentralized to the software. Offenders can be expelled from the list, but this is generally more difficult than when the list is moderated. In a moderated list, the moderator can make a unilateral judgment and step in proactively, while in an unmoderated list, this has to be done by consensus, which can take longer to achieve. Advantages of an unmoderated list are that it can be hosted (placed on a server) by anyone or any organization, or by an Internet-based company (whether non-profit-making or commercial) and is cheap to operate, since there are no ongoing resource requirements other than electricity and telephone connectivity.

In a moderated list, a list manager is appointed, whose functions include the role of reading all messages before they are sent out to everyone on the list.

A **moderated** list is **good** if:

- the nature of the content that is posted is likely to be sensitive, controversial or have special needs regarding accuracy, legal status or the presentation of commercial information
- the list is large and its lifespan is likely to be long
- the subject is broad.

A moderated list provides greater opportunities to structure or analyse discussion. However, it is perceived to be less democratic than unmoderated lists, since one partner takes on the role of coordinating the list, and may choose to steer the discussion. Generally the list is hosted by one organization, often the lead partner. It requires resources to manage the list.

Both moderated and unmoderated discussion lists can be used to collect responses to questionnaires and to conduct specific enquiries, even qualitative research (interviews and focus groups).

#### **An illustrative example of launching an electronic discussion**

The United Kingdom Commission for Intellectual Property Rights (CIPR) (<http://www.iprcommission.org/>) ran a series of discussions, each lasting two weeks, covering aspects of intellectual property. The first week's theme was "Traditional knowledge and folklore". The organizers posted a message to start the topic. The start message had been specially commissioned from an academic for the discussion. It was about two pages long, and raised key issues related to the topic, asked sharp questions and made provocative statements. In response, anyone who had subscribed to the conference list (a separate list for this occasion, rather than the Commission's regular discussion list), was invited to post comments, opinions and even short papers.

### **5. Moderating an e-discussion**

Moderating an e-discussion list implies reading every message and taking the decision to let it go on to the list or not (and entering into any correspondence required). The moderator ensures that the start-up message is drafted and complete, deals with any aggressive, rude or other otherwise inappropriate behaviour by participants ("netiquette" issues), sends out warnings or reminders where necessary and liaises with the hosting personnel regarding technical problems.

### **6. Internet Relay Chat – basic information**

As mentioned earlier, making use of the Internet for web browsing is fundamentally different to e-mail, and requires considerably more resources in terms of computer processing speed and power, telephone connectivity and bandwidth. When the necessary resources are available, a web-based tool can supply many of the functions provided by e-mail, and others besides.

Internet Relay Chat (IRC) is one such tool. Structurally, IRC is not part of the Internet backbone, but instead runs alongside it in a number of separate networks (or “nets”) of IRC servers, which allow users to connect to IRC. Generally, the user runs a program called a “client” to connect to a server on one of the IRC nets. The server relays information to and from other servers on the same net.

## Tools and resources for everyone

[Section 1](#) below covers software that can be used at low or no cost to build a web site, including various supplementary facilities.

[Section 2](#) lists useful free tools which users can install on their own computers.

[Section 3](#) sets out some (generally free) software available on the Internet to provide an “application service” such as a discussion list.

[Section 4](#) briefly describes some leading corporate software.

[Section 5](#) describes some Open Access Initiatives in greater detail.

[Section 6](#) lists e-journals of special interest to developing countries.

All URLs accessed August 2004.

### 1. Build a low-cost web site

Source: KnowNet Weaver Resources (<http://www.knownetweaver.org/>) KnowNet Weaver is a toolkit developed by SDNP (Sustainable Development Network Programme), India. It enables you to create your own interactive web site free of cost, using freeware and shareware available on the Internet. The aim is to facilitate knowledge networking among local organizations and communities in developing countries by allowing them access to the Internet and space on the web.

#### *Software for designing web pages*

Web page designing software enables users to develop appealing web sites without having any technical knowledge of hypertext markup language (HTML), the standard language for web site designing.

[CoffeeCup HTML Editor ++](http://www.coffeecup.com) (<http://www.coffeecup.com>)

CoffeeCup is extremely user-friendly, graphic menu-driven software for web page designing.

#### **Advantages**

- Easy to learn and user-friendly
- Contains many free Perl and CGI scripts to make the site more attractive.

## Limitations

- The large file size of the software means that it takes a long time to download. Once it has been downloaded, however, it is quick and efficient, and produces web pages which load at optimum speeds.

## *Adding a hit counter*

A hit counter keeps track of the number of visitors coming to your web site. It provides an indication of how popular your web site is, and gives further information about the users coming to the site (which country they come from, what browser software they are using, etc.).

[TheCounter.com](http://www.thecounter.com) (<http://www.thecounter.com>)

TheCounter.com gives you daily in-depth traffic reports, with no need to install any server-side scripts.

## Advantages

- Very easy to configure and customize your own counter.
- The counter comes with or without an advertisement banner, and can be made invisible on the web site.
- Provides excellent analysis of hits – hits per day, hits per month, last 30 hits, hits coming from search engines, specification of browsers from which the hits came, etc.

## Limitations

- The counter sometimes takes a long time to appear, which increases the overall time a web page takes to download.
- The counter can only track the hits coming on to the page on which it is set up. It does not track the overall hits on a web site.
- The counter sometimes interferes with browsers which refuse to run Javascript.

## *Adding a guest book*

A guest book enables users to add their feedback and comments about the site. At the same time, users can read what other visitors had to say about the site.

[Guest Gear](http://htmlgear.lycos.com/specs/book.html) (<http://htmlgear.lycos.com/specs/book.html>)

A simple to use guest book with many interactive features to help you respond promptly to visitors signing up at your site.

## Advantages

- The guest book is very easy to customize, in terms of information needed from the user.
- Has the option of allowing the web manager to delete or modify comments left by the visitor. Useful if visitors are unruly, rude or intolerant.

- An auto-reply facility exists to send a standard reply to visitors who have signed the guest book.
- The guest book can be configured to send you a notification every time a user signs up.

## Limitations

- An advertisement banner is displayed on the guest book.

## *Adding a link checker*

Bad links give a very bad impression of the web site. Links become bad because the URL of the linked pages changes or the pages have been removed from the web. Such links need to be identified and then corrected or removed.

[Xenu's Link Sleuth \(TM\) \(http://home.snafu.de/tilman/xenulink.html\)](http://home.snafu.de/tilman/xenulink.html)

Xenu is easy to download and install. It quickly checks the internal and external links to a web site. It then neatly classifies the links that are not working according to the pages on which they are found.

## Advantages

- Can check any number of links, with no upper limit.
- Very fast, as it can check from 2 to 100 links (but, for optimal results, do not increase the setting to more than 13).
- Can also check graphical links.

## Limitations

- Does not check links to gopher sites.

## *Adding a search engine*

A search engine allows the web site visitor to locate information on the current web site or elsewhere.

[Thunderstone Search Engine \(http://www.thunderstone.com\)](http://www.thunderstone.com)

The Thunderstone engine neatly lists the information on the web site according to keywords. It supports Boolean searching based on "AND" and "OR".

## Advantages

- Thunderstone creates an index file of the web site, which is automatically updated once a fortnight. Alternatively, it can also be updated manually as often as once a day.
- The index file is maintained at the Thunderstone web site and therefore does not take up server memory.

## Limitations

- Can only be installed when the e-mail address matches the domain name of the web site.
- The search engine can only be used for web sites with up to 5 000 pages.
- Since the index file is stored at the Thunderstone web site, rather than the user's web site, Thunderstone should not be used if there are concerns about

confidentiality. Equally, if the Thunderstone web site is offline for any reason, the index file cannot be updated and the search facility will not work.

### ***Hosting the web site on the World Wide Web***

The web site needs to be hosted on a server attached to the World Wide Web. You can make use of a number of free or paid-for services which will host your web pages, such as the one described below.

#### **[Tripod Web Server \(http://www.tripod.lycos.com\)](http://www.tripod.lycos.com)**

Tripod allows you to host your web site on the World Wide Web. A unique name (the URL) will be issued and, using this, the web site can be viewed by anyone from any part of the world.

#### **Advantages**

- A web site of up to 10 megabytes (MB) in size can be hosted on the Tripod server.
- Tripod allows graphical and nongraphical File Transfer Protocol (FTP) transfers to enable remote uploading of new or modified files on to the web.
- The server has a very good performance record – the very high uptime of the server means that your web site will be accessible most of the time.
- Does not come with a banner on the same page.

#### **Limitations**

- The URLs issued are long, and in the form <http://members.tripod.com/xyz>, where “xyz” is the name of your choice. This limits the appeal of your own site, which will have its own identity if it is displayed under its own domain name (see below)
- Owing to the 10MB limit, Tripod is not appropriate for large web sites or sites which have the potential to become large in future.

### ***Registering your own domain name***

Allows your web site to have a domain name such as xyz.org, xyz.com or xyz.net, where “xyz” is the name of your choice. Customized domain names give the web site a professional appeal.

#### **[NameZero \(http://www.namezero.com/\)](http://www.namezero.com/)**

The site registers domain names of your choice.

#### **Advantages**

- The domain name is registered in less than two days.
- Very easy to register a domain name, as minimal information is required for signing up.
- The site offers a customized e-mail address based on the domain name of the web site you have registered.

## Limitations

- The site does not offer web site hosting space. The web site would therefore have to be hosted on some other server, and would be accessed by typing in the customized domain name.
- A banner occupies the lower portion of the web site.
- NameZero does not register country-specific domain names, e.g. xyz.in (India) or xyz.uk (United Kingdom).

## Language translation service

Adding translation services can make your site friendly to net surfers who find it more comfortable to browse web pages written in their native languages. Translation software is currently available for many Western languages, including English, French, German, Italian, Portuguese and Spanish.

**SystranLinks** (<http://www.systransoft.com/SystranLinks.html>)

SystranLinks is a web-based tool and therefore does not require any software to be downloaded. It ensures that you get a feature-rich, scalable and reliable translation service – without the investment and effort needed to install, operate and support your own translation system.

## Advantages

- Easy step-by-step instructions are available for previewing and installing SystranLinks on your web site.
- Allows the translated contents to be displayed online immediately.

## Limitations

- Some of the customized translation services are not a part of the free feature.
- The translation does not handle web pages with frames.
- Some problems are observed in translating huge web pages.
- Machine translation is still an imprecise art, and so some of the translations will contain elementary errors that might reflect badly on your site. It is important to provide a disclaimer when using such translation software.

## Image file size shrinker

Image files on a web site are often very large. As a result, they increase the time it takes to download or open a web page. Image file size shrinker software reduces the size of such files without compromising too much on the quality.

**Spinwave Crunchers** (<http://www.spinwave.com/crunchers.html>)

Spinwave is an excellent image-processing tool to optimize image files in the popular JPEG and GIF formats. It shrinks the file size, with the result that the web site operates faster. Clearly, smaller file sizes mean less disk space is required.

## **Advantages**

- Web-based image processing tool: no software needs to be downloaded.
- File size can be reduced by as much as 90% of the actual size.
- Users can view and compare the original image with the image in different degrees of file size reduction, and select the quality level they prefer.

## **Limitations**

- Does not work for image types other than JPEG or GIF.
- The image file loses considerable quality and clarity when reduced over 35% of its size.
- There is a charge for the desktop version of the same image processing tool – which could be installed on your machine.
- Does not work with America Online (AOL) browsers.

## ***Monitoring the web site***

This free service sends an alert by e-mail whenever the web site goes down. This is beneficial for people who have their home page hosted, but do not know how frequently their server is up/down.

**[Web Site Monitor \(http://www.Netwhistle.com\)](http://www.Netwhistle.com)**

This is an online web monitoring service provided by Netwhistle to web site designers to inform them about the performance of their servers or the servers where they have hosted their web sites.

## **Advantages**

- The service is free of charge.
- The information about the server can be received by e-mail or on a pager.
- The service puts an end to the myth that the servers of web space providers never go down.

## **Limitations**

- This is not downloadable software. Instead, one has to register on their site.
- Web Site Monitor only provides weekly reports.
- The service is not very descriptive.

## ***Adding a privacy statement***

Internet research has repeatedly shown that many consumers are reluctant to engage in electronic transactions because of concerns about the privacy of their personal data. Privacy policies and accurate public statements outlining such policies are a vital step towards encouraging openness and trust in electric commerce among visitors to web sites. They can help visitors to make informed choices about entrusting an organization with personal data and doing business with it.

## OECD Privacy Statement Generator

1. How to develop a privacy statement:

<http://cs3-hq.oecd.org/scripts/pwv3/PWPart1.htm>

2. Questionnaire generator:

<http://cs3-hq.oecd.org/scripts/pwv3/Login.asp>

The Organisation for Economic Co-operation and Development (OECD) Privacy Guidelines represent an international consensus on how best to balance effective privacy protection with the free flow of personal data. Openness is a key principle of the Guidelines, which are flexible and allow for various means of compliance. To help implement the Guidelines in the electronic world, the OECD has developed the OECD Privacy Policy Statement Generator in cooperation with industry, privacy experts and consumer organizations. The Generator, which has been endorsed by the OECD's 29 Member countries, aims to offer guidance on compliance with the Guidelines and to help organizations develop privacy policies and statements for display on their web sites.

### Advantages

- The service is free of charge.
- The statement is generated automatically as a web page after the user has answered the questions.

### Limitations

- This is not downloadable software. Instead, one has to register on their site.
- The questions are not always easy to answer, and thus the results have to be checked carefully.

## 2. Useful tools for users

### *Web to e-mail services*

Users who have e-mail capability, but are unable to access the Internet in the form of web pages seen through a browser, can use web-to-e-mail services to retrieve information from any public web site anywhere in the world using e-mail.

[www4mail \(Web Navigation & Database Search by E-Mail\)](http://www4mail.org/)

<http://www4mail.org/>

Web-to-E-mail servers are computers which fetch documents from the web, and send them to the user as e-mail messages, either in plain text or html. To use the system, simply send an e-mail message addressed to one of the free www4mail servers, e.g. [www4mail@web.bellanet.org](mailto:www4mail@web.bellanet.org). Leave the subject line blank. In the body of the e-mail message, type GET plus the URL of the web page you want to read.

## Advantages

- The service is very easy to use.
- Is able to send the page back as an HTML attachment, which is designed to be read in a web browser, such as Netscape or Internet Explorer.
- Handles frames. When a requested document contains frames, www4mail inserts suitable links to each framed document.

## Limitations

- Delays are found in delivering requested web pages at certain times.

[GetWeb \(http://www.healthnet.org/howtogetweb.php\)](http://www.healthnet.org/howtogetweb.php)

SATELLIFE, a global health information network, developed GetWeb so that health professionals who only have e-mail can access information on the World Wide Web. Users prepare an e-mail message indicating the web address of a document or site they wish to “visit”. GetWeb then processes the message, retrieves the web content, and returns the results as text in an e-mail message. To retrieve linked documents or pages at a web site, further messages are sent to GetWeb for automated processing.

## Advantages

- SATELLIFE’s GetWeb server allows you to request the text content of World Wide Web pages through e-mail.
- Web pages often reference other web pages by means of hyperlinks. To follow a hyperlink, simply identify the URL and send another e-mail message requesting that page.
- You can retrieve many hyperlinked documents in one message by typing in “get” followed by each URL.
- You can use GetWeb to search the World Wide Web by using it to access several Internet search engines (e.g. AltaVista and Yahoo!).

## Limitations

- Requires careful syntax, spelling and punctuation, otherwise the program can fail.

## *Text-to-speech software*

On a computer equipped with a sound card, text-to-speech software reads aloud text displayed on the screen in different tones and accents. This is especially useful for people with visual difficulties.

[Readplease \(http://www.readplease.com\)](http://www.readplease.com)

After installation on your computer, ReadPlease will read any text displayed on the screen. The text may come from your browser, e-mail, word processor or spreadsheet – and in just about any Windows application. For English, French and German, ReadPlease can read the text in the language in which it is written.

## Advantages

- The software is only 6.9MB in size and can be freely downloaded.
- Very easy to use – just copy and paste the text to be read onto the ReadPlease screen.
- Users can select the voice used: male or female, in different accents, and with the option of changing the pitch and pace at which the text is being read out.

## Limitations

- There is a charge for the professional ReadPlease software with more advanced features.
- Files of more than 16 000 bytes in size cannot be read on the free version.
- The free software comes only with a Western accent and voice.

### 3. Knowledge-management-related application service providers

An application service provider (ASP) is a technology company that develops and delivers software tools over the Internet, usually for a monthly fee. Familiar ASPs include Topica for e-mail newsletters (or e-mail listservs) and Yahoo Mail for sending and receiving e-mail via the web.

There are over 300 ASPs in operation today that serve non-profit-making and public-sector organizations, offering services to meet non-profit needs, such as:

- accounting
- activism and advocacy (e-mail and fax systems, legislative advocacy)
- alumni portals
- auctions
- content management and web site maintenance
- credit card transactions online
- data and database management
- distance learning
- donor and membership management
- e-mail messaging and listservs
- event management
- fundraising online
- group collaboration (virtual offices)
- planned giving
- stock donations
- surveys
- search engines
- traffic access logs
- volunteer recruitment
- web discussion forums

In addition, some ASPs offer multiple services as part of integrated suites.

Most ASPs are for-profit companies, but a small number are not-for-profit. As ASP services improve, high-speed Internet connections become more accessible, and technology demands increase, ASPs will become more and more important.

Here are some selected ASPs and the services they provide:

- <http://www.Convio.com>: web site hosting, e-mail messaging, event management, surveys, online fundraising
- <http://www.seeuthere.com>: online event management
- <http://www.communityapps.com>: private collaboration spaces and calendars
- <http://www.SmarterOrg.com>: online learning environments.

(Source: Stein & Kenyon, 2002)

<http://www.topica.com> Topica is a great free service you can use to distribute an e-mail newsletter or set up an e-mail discussion list – sometimes called a listserv. This service is extremely easy to set up, whether you're starting from scratch or already have 300 e-mail addresses. You can add a handy "e-mail subscription box" to your web site to allow visitors to subscribe easily. An archive of all your messages is stored automatically on the Topica web site, but that archive is not full-text searchable, nor does it store any attachments that were originally sent. Two downsides to this service are that system e-mails will come from XXX.topica.com, and some minor Topica branding will appear at the bottom of every message that gets sent out.

<http://groups.yahoo.com> YahooGroups is another great, basic, free service (similar to Topica.com) that you can use to distribute e-mail newsletters and set up e-mail discussion lists. All the features work the same as Topica.com (see above), except that the archive of messages (that is stored automatically on the YahooGroups web site) is full-text searchable, and it can store any attachments that were originally sent.

<http://www.zoomerang.com> Zoomerang exclusively provides online surveys that you can plug into your web site or announce in your e-newsletter. They offer a free but time-limited survey service, which should give you long enough to run a survey. It's fairly easy to build your own survey using their on-screen instructions and options, and you get real-time results which can also be downloaded into spreadsheet programs as needed. You can upgrade to more features with a service that costs around US\$350 per year. To get started, just visit the Zoomerang web site, register for free to become a member, and proceed to set up a survey.

<http://www.ezboard.com> EZBoard is an easy and affordable way to set up a web discussion forum that can be plugged into your web site. Many webmasters opt to install complex scripts to set up web forums, but this ASP makes it easy with multiple display formats, colours, layouts, features and more. They offer a free service that displays advertising, and pricing starts at as little as US\$5 per month for more features. To get started, visit the web site, see how other organizations have set up their forums, and then register to try it out.

<http://www.atomz.com> Atomz is an easy and free way to put a search engine on your web site to help visitors find specific items on it. To get started, visit the Atomz

web site and sign up for the service. Then you have to have your webmaster or webmistress install a few lines of Java software code on your web site so that your web site becomes enabled. Once a week, you get a report on all the searches that were done on your web site.

<http://www.webtrends.live.com> WebTrends Live offers a free service that allows you to track all the statistics of visits to your web site. Their “Personal Solution” service allows you to track an unlimited number of web pages. To get started, visit the WebTrends Live web site and register. Then you have to have your webmaster or webmistress install a few lines of Java software code on your site so that your web site becomes enabled. The traffic reports are available on the WebTrends Live web site and show number of visits to pages, most popular pages, referrer logs, browsers used, and more. More fully featured versions of this service are available for a monthly fee.

<http://www.cast.org/bobby> The “Bobby” site that evaluates web sites “on the spot” to determine how accessible they are for people with disabilities. Go to the Bobby site and type in your web address and it will show you the areas at your site that need improvement. If your site is “Bobby-approved,” you can apply to have a little Bobby icon for your home page.

<http://www.benton.org/publibrary/toolkits/stratcommtool.html> The Benton Foundation “Best Practices Toolkit” is consistently a good source of information on non-profit Internet use. Related to our topic, we like the entire section entitled “Think it through: what it takes to design and fund an effective communications strategy.” An effective communications strategy reflects your organization’s mission, goals and objectives, and is well integrated into daily operations. It requires a clear articulation of audience, clarity of message, and choice of media platform. It also consists of an ongoing feedback relationship between planning and evaluation.

(Source: Stein & Osten, 2001)

#### **4. Commercial web portal software**

**Autonomy** (<http://www.autonomy.com>)

Autonomy software is based on algorithms applying Bayesian probability statistics to text. Autonomy has defined its three principal areas of commercial activity as enterprise, new media for publishing and e-commerce. The specific offerings are (1) out-of-the-box portal and (2) server solutions for publishers, (3) a “daily briefing” and (4) a “user alert” for news, both based on monitoring intranets and selected web sites, (5) user profiling of web site visitors, (6) targeted advertising on the Internet, (7) a content-filtering service to screen out “inappropriate content” and (8) a community-building tool that puts users with similar interests in touch with each other by matching individual interest profiles.

**CleverPath Portal (formerly MyEureka, Eureka Portal and Jasmine Portal)**  
(<http://www3.ca.com/Solutions/Product.asp?ID=262>)

An enterprise information portal (EIP) that provides a desktop from which users may investigate all the information that is relevant to their jobs, and also a workplace

from which they may conduct transactional activities within the organization and in business-to-business environments such as electronic procurement. In addition, CleverPath directly supports collaborative discussion groups. Recent releases have significantly extended the product, particularly in its support for content management. Particularly strong on back-end communication capabilities, dynamic personalization, web crawling and knowledge management. Drawing on and integrating numerous other Computer Associates (CA) technologies, CleverPath is currently the leading EIP on the market, with some 600 customers.

**Collexis** (<http://www.collexis.com>)

Collexis was originally developed in the public sector, with support from the Dutch and German governments for the SHARED (Scientists for Health And Research for Development) project. It is a web-based technology for highly efficient, yet simple information mediation of large, widespread and complex data sets. Collexis technology is based on the principle of scanning text and extracting concepts into “conceptual fingerprints” – small index terms which can be stored in databases and then matched during the process of searching. The technology is being applied to activities ranging from biosemantics (using it to test hypotheses and analyse vast collections of biomedical evidence) to expert profiling and identification, and the management of online databases of journal articles and books.

**Microsoft’s SharePoint Portal Server** (<http://www.microsoft.com/sharepoint/>)

SharePoint Portal Server 2003 aims to help knowledge workers easily find, share, and publish information. It provides a single solution for corporate dashboard sites, document management, content searching and team collaboration. SharePoint Portal Server integrates document management and search functions with Microsoft Windows Explorer, Microsoft Office applications and web browsers. It offers: version tracking to record the history of documents; application of descriptive, searchable information to identify a document; document publishing control; automated routing of documents to reviewers; web discussions for online comments by multiple document reviewers; and control of document access based on user roles. It helps users collaborate with others, receive feedback from reviewers, identify the document with descriptive information such as keywords, and publish the document for a wide audience.

**Plumtree** (<http://www.plumtree.com>)

The Plumtree Corporate Portal is designed to operate at the centre of large businesses and as part of a network of other portals and services. The third major generation of the Plumtree Corporate Portal, the Plumtree Corporate Portal 4.x series, divides the product’s features into four categories: the Massively Parallel Portal Engine, Communities and Collaboration, enterprise manageability, and the Portal Network Architecture. The Massively Parallel Portal Engine includes the engine’s core messaging technology and the standards-based protocols that connect Plumtree Web Servers to Plumtree Gadget Servers. It harnesses the power of a wide range of content and application servers from different vendors, operating on different platforms simultaneously. Communities are a powerful forum for organizing different business services for different groups of users, and for driving collaboration

between employees, customers and partners. Finally, the Portal Network Architecture includes the technologies that create networks between multiple Plumtree deployments, or between portals and other devices. Plumtree claims “more than 250 customers .... have licensed more than 5 000 000 seats”, and says that the Plumtree Corporate Portal is the most widely deployed portal in the world.

### **PowerSQRIBE 2.0**

PowerSQRIBE is a Java-based tool for interactive query and analysis, with a primary market in report generation and a secondary market in web servers. With its web-based architecture and graphical interface, PowerSQRIBE enables companies to deliver dynamic information access and analysis capabilities to a broad corporate audience. PowerSQRIBE requires no client installation and administration, and minimal maintenance costs. PowerSQRIBE’s Java architecture integrates with SQRIBE’s enterprise information delivery framework for the creation, management, delivery and analysis of all enterprise information. SQRIBE’s enterprise information framework includes ReportMart, a 100% Pure Java information server, that manages and delivers information of all types, including reports from enterprise applications written with any reporting tool, including SQRIBE’s SQR reporting technology, output from business intelligence tools, Word documents, Excel spreadsheets, graphics, video clips and custom data formats. ReportMart can also publish reports directly from commercial software applications such as Oracle, PeopleSoft, Scopus, and others.

### **Semio (<http://www.semio.com>)**

Semio’s suite of information categorization solutions are powered by a patented technology which (1) automatically extracts key concepts from large volumes of text-based content, (2) structures the information into logical categories, drawing connections between concepts, and (3) provides user-friendly access to the structured information. Semio Taxonomy is Semio’s flagship product, which automatically categorizes and structures text-based information in a user-friendly, browsable interface. Semio Map provides a graphical perspective on text collections of any size. Users can quickly find the specific information they need while getting a clear picture of the larger context of related concepts.

### **Tacit (<http://www.tacit.com>)**

Tacit focuses on the identification of experts in the enterprise. Through its Expertise Automation product, Tacit enables the identification and bringing together of the most appropriate people in the organization whenever there is a need to solve a problem, serve a customer or move the business forward in any situation. The KnowledgeMail engine provides full expertise discovery and search capabilities by integrating with key enterprise systems, such as e-mail and document repositories. KnowledgeMail continuously discovers corporate knowledge by intelligently parsing electronic messages and documents to learn about the work-focus, interests and experiences of each user. The results are used for the automatic generation of a searchable, up-to-date expertise database, easily accessible from a variety of interfaces including e-mail, web browsers, corporate portals and mobile devices.

**Viador** (<http://www.viador.com>)

The Viador e-Portal is a powerful, self-service solution for working with the organization's valuable information and intellectual assets. Technically speaking, it is a platform that integrates vital applications, document systems, databases, information feeds, reports, raw data, news sources and calendars for delivery to any community of users – employees, partners or customers. Viador portals come in all shapes and sizes – from business-to-employee portals that save time and improve productivity, to business-to-partner and customer portals that generate revenue, reduce costs and improve retention. All Viador portals are based on the Viador E-Portal Framework – a robust enterprise portal framework that leverages an organization's existing information systems investments to significantly reduce costs, improve productivity and create new sources of revenue. Viador E-Portal Express enables organizations quickly to deploy highly scalable portal solutions that deliver immediate user benefits and help meet specific business goals.

## 5. Open access initiatives

### *HINARI*

The most important initiative of this kind focusing exclusively on the health sector is undoubtedly WHO's HINARI (Health InterNetwork Access to Research Initiative) project (<http://www.healthinternetwork.org>). HINARI was launched in January 2002, with the support of six of the world's leading medical publishers (Blackwell, Elsevier Science, the Harcourt Worldwide STM Group, Wolters Kluwer International Health & Science, Springer Verlag and John Wiley). Its goal is to enable "more than 100 of the poorest countries in the world to access scientific information free of charge through the Internet."

The project currently offers over 2 000 of the world's leading medical and scientific journals to medical schools and research institutions in developing countries for free or at greatly reduced rates. More publishers will be joining as this initiative grows. (For further details, see unit 4 of this module, "Knowledge networks".)

### *PERI*

The other major open access initiative emerging from researcher/librarian/publisher discussions in the last few years is the Programme for the Enhancement of Research Information (PERI) (<http://www.inasp.info/peri/>). With funding largely from Nordic bilateral development organizations such as DANIDA and SIDA, PERI started operations in January 2001, with four main objectives: (1) to facilitate the acquisition of international information and knowledge through electronic information and communication technologies (ICTs); (2) to strengthen and develop access to journals in the regions as a medium for the dissemination of results from national and regional research; (3) to provide awareness or training in the use, evaluation and management of ICTs; and (4) to enhance skills in the preparation, production and management of journals.

PERI currently provides access to over 7 000 full-text online journals in science, technology, medicine, social science and the humanities, as well as to databases and

document delivery. The medical journals overlap with those included in HINARI, although PERI has agreements with more publishers and thus includes even more health journals than HINARI.

### **HighWire Press**

The non-profit HighWire Press (<http://highwire.stanford.edu/>), launched as an independent self-sustaining concern by Stanford University, California, in 1995, currently offers 393 journals from 102 publishers in all disciplines (about 100 are in the health sector). Although most of the journals require subscription, a significant minority of these are free (as of February 2002, HighWire was “assisting in the online publication of 380 677 free full-text articles out of a total of 1 113 239 articles”).

### **Electronic Journals Library**

In a similar category to HighWire, but based on a library (rather than a publisher) consortium, is the University of Regensburg’s Electronic Journals Library (<http://rzblx1.uni-regensburg.de/ezeit/>), which provides a unified interface to access full text journal articles from 8 465 titles in all areas of research, 908 of which are available online only. This site separates out journals that provide access to (1) full-text articles for free (currently 1 769 journals), (2) full-text articles for users of a member library on the basis of a subscription, or (3) tables of contents and abstracts only (generally available free of charge).

### **Other sources**

Among other sources for content are leading individual publishers’ sites, foremost among which is that of the *British Medical Journal* Publishing Group (<http://www.bmjpg.com>). It provides free access to all the journals in the Group, as well as to the compendious and highly regarded *Clinical Evidence*. Another provider of free information under a consistent interface and technical format is BioMed Central (<http://www.biomedcentral.com>). Various smaller schemes and publishers (such as Bioline, SciELO and SPARC) are also worth considering.

### **Pre-print archives**

The first pre-print archive was established in 1991. There are now some 7 000 scientific and technical pre-print sites. Many are based on standards developed by the Open Archives Initiative (OAI) to search and retrieve documents in distributed archives and at its own site (<http://www.openarchives.org>) The ambition of the OAI movement is to create a “a global library that facilitates searching, data retrieval, cross-linking, as well as stable long-term archiving”. A recently announced OAI-compatible effort is my.OAI (<http://www.myoai.com/>), a full-featured search engine for a selected list of metadata databases from the Open Archives Initiative project.

A major initiative in this area (although it is not OAI-compatible) is the Pre-print Network, which provides a search engine to cross-search 4 000 pre-print archives. Altogether, around 375 000 scientific and technical pre-prints can be searched via the Pre-print Network.

## 6. E-journals of special interest to developing countries

### **ExtraMED**

Founded in 1995, *ExtraMED* (<http://www.iwsp.org/ExtraMED.htm>) has to date published some 30 000 articles included in 316 journals from 61 countries, largely in the developing world. *ExtraMED* has been issued on CD-ROM, and will now be issued for free on the Internet in partnership with BioMed Central.

Taking its name from the fact that it comprises local journals that are “extra” to MEDLINE, *ExtraMED* focuses on journals that are largely excluded from the international indexes. The *ExtraMED* Consortium of Journals was originally selected through WHO’s regional Index Medicus projects. It thus comprises the best biomedical journals in the developing world, and is by far the largest full-text source of such literature.

All the articles from all the journals included have been scanned and stored as page images (including all the photographs, diagrams, etc.). All of the titles, bibliographic data, keywords and abstracts have been re-keyed to allow for full-text searching of these elements. This is necessary, since *ExtraMED* mainly carries developing-country journals that are not indexed anywhere else: the only way users can discover what has been published is by searching the database. *ExtraMED* represents an act of validation, and an assertion of information equity.

### **The Scientific Electronic Library Online (SciELO)**

SciELO (<http://www.scielo.br/>) was founded in 1997 in Brazil by BIREME (the Latin American and the Caribbean Centre on Health Sciences Information, a specialized centre of the Pan American Health Organization) as a collaborative project between BIREME, FAPESP (*Fundação de Amparo à Pesquisa do Estado de São Paulo*, a governmental foundation) and scientific publishers. SciELO began with a pilot project involving 10 Brazilian journals and is now approaching 200 science, technology and medicine journals from nine Latin American and Caribbean countries, and Spain.

SciELO is a model for cooperative electronic publishing of scientific journals on the Internet. Specially conceived to meet the scientific communication needs of developing countries, the SciELO Model comprises three components:

- The SciELO methodology – a set of technical and bibliographic rules governing the electronic publication of complete editions of scientific journals, the organization of searchable bibliographical and full-text databases, the preservation of electronic archives and the production of statistical indicators of scientific literature usage and impact, as well as journal evaluation criteria based on international scientific communication standards.
- The application of the methodology to operate web sites of collections of electronic journals (national sites as well as thematic sites).
- The development of partnerships among national and international scientific communication players – authors, editors, scientific and technological institutions, funding agencies, universities, libraries, scientific and technological

information centres, aiming at the dissemination, improvement and sustainability of the SciELO model.

### ***Bioline International***

Bioline International (<http://www.bioline.org.br/>) was founded in 1993 and now includes the full text of 43 journals, as well as a selection of books, newsletters, symposia, reports and databases covering agriculture, biology, medicine, science and technology. To date, the content comes from Brazil, Cuba, India, Indonesia, Kenya, South Africa, Uganda and Zimbabwe.

A key aim of the project is to help journal publishers in developing countries to get their journals online and achieve visibility and subscription revenue (where this is charged).

Bioline is operated by scientists and librarians, who believe that information can be distributed more widely, more cheaply and with added scientific value using electronic means. It is a not-for-profit electronic publishing service committed to providing access to quality research journals published in developing countries. Bioline's goal of reducing the South-to-North knowledge gap is crucial to a global understanding of health (tropical medicine, infectious diseases, epidemiology, emerging new diseases), biodiversity, the environment, conservation and international development.

Bioline is a collaborative initiative of the University of Toronto Libraries, Canada (management office), the Reference Center on Environmental Information - BDT, Brazil (host computer and software development) and Bioline/UK (liaison). Much of the information on Bioline (abstracts of papers in journals, reports, technical documents, books and newsletters) is provided free of charge, and it operates on a not-for-profit basis.

### ***African Journals OnLine (AJOL)***

An activity of the International Network for the Availability of Scientific Publications (INASP), Oxford, United Kingdom, African Journals OnLine (<http://www.ajol.info/>) was founded in 1997 and offers the tables of contents and abstracts of over 70 journals in the fields of agriculture, health, science and technology and the social sciences. The content is from countries throughout Africa.

The aims of African Journals OnLine are:

- to enable the results of research undertaken and published in Africa to become more widely known and accessible
- to strengthen the African scholarly and academic publishing sector by providing income both through encouraging print or electronic subscriptions and through the purchase of single articles
- to assess the impact of using the Internet to promote African-published journals
- to establish an efficient and cost-effective programme, the management and administration of which could be transferred to an African country.

African Journals OnLine has also been offering a document delivery service, to journals about Africa but published elsewhere, pages in French as well as in English and instructions to authors, as well as monitoring and evaluating the use and impact of the service.

Over 2 500 people have registered to use the service and the site receives over 44 000 hits each month.

## Recommended reading

Breeding M (1999). Does the Web spell doom for CD and DVD?" *Computers in Libraries*, 19(10). Available online at:

<http://www.infotoday.com/cilmag/nov99/breeding.htm> (accessed August 2004)

Denning S (2000). *The springboard: how storytelling ignites action in knowledge-era organizations*. Boston, MA, Butterworth-Heinemann. Chapters available at <http://www.stevedenning.com> (accessed August 2004).

*This book is about storytelling as a central component of knowledge management, and it is a story in itself: the career path of its author, Stephen Denning. Denning spent almost 20 years rising through the ranks of the World Bank as an Africa specialist. In April 1996, he made a 10-minute presentation at a meeting of senior managers of the Bank. The talk was in response to a request for recommendations for improving the Bank's information systems. Denning's conclusion was that the World Bank hadn't organized its knowledge in a way that would enable it to share it with the millions of people who make decisions about poverty.*

*"We were drowning in information, managing it very inefficiently, and if we cleaned it up we would save a lot of money. But it occurred to me that we'd still not be a very relevant organization. The World Bank had been a lending organization most of its life, and we were facing private-sector banks that were lending much more than we were. At that time, people were asking themselves if we had a future at all. So I started to ask myself a different question: Suppose we were to share our knowledge? We had over 50 years' worth of know-how about what works in development and what doesn't. Inside the organization, if you knew who knew what stuff, you could have lunch with them and find out, but if you didn't know them you were in trouble. If you were outside the organization, you didn't have a prayer. But if we were to make it easy for anyone in the world to find out what we know, we could become relevant and useful."*

*As he tells it, at that time this conclusion was too vast to grasp or even offer so, in his presentation to the meeting participants, he told the following story:*

*"In June 1995, a health worker in Kamana, Zambia, logged on to the Centers for Disease Control web site and got the answer to a question on how to treat malaria. This story happened, not in June 2015, but in June 1995. This is not a rich country, it is Zambia, one of the least developed countries in the world. It is not even the capital of the country; it is six hundred kilometres away. But the most striking aspect of the picture is this: our organization isn't in it. Our organization doesn't have its know-how and expertise organized in such a way that someone like the health worker in Zambia can have access to it. But just imagine if it had! We could get ourselves organized so that professionals have access to the resources needed. Just in time and just enough."*

*A direct consequence of this presentation was that it caught the attention of top management at the Bank. Denning was named a programme director – Chief Knowledge Strategist, no less – and assigned the task of making the Bank a knowledge organization. Denning's work in straightening out the Bank's information systems led him to raise fundamental questions about how the bank accomplished its mission. Those questions contributed to the Bank's reorientation towards sharing*

knowledge among its staff and clients. Through his varied experiences, Denning became convinced of the vital role of storytelling in changing individuals and organizations.

*“The most important thing that we learned was that communities were the heart and soul of the whole thing. This was something we learned by experience, not by design. When we started, there were just one or two communities organization-wide. After a year, we looked around and saw that the only areas where knowledge sharing was happening effectively was where there were communities. So the programming increasingly revolved around supporting, nurturing and strengthening those communities. By the end of ‘98, there were over 100 “thematic groups” covering every aspect of World Bank operations and activities. ”*

Denning has an ambivalent viewpoint regarding the role of technology in knowledge management.

*“We wouldn’t be talking about knowledge sharing if e-mail and the Web didn’t exist. But if you don’t have communities, it doesn’t matter how much technology you have. It’s also true that information – and technology more generally – is managed in a different way from sharing knowledge. Managing information requires hierarchy, structure, control, discipline and commands. This is an engineering task to establish order in the sea of information that is flowing around the organization, and you manage this top-down. That’s the exact opposite of how you get knowledge sharing going, which is a matter of flow, of community. That’s a matter of horizontal pathways in the organization, of human passion and interest and commitment. If you try to manage that in a top-down way, it dies on the spot.”*

Recalling his experience in offering the *Zambian story* in that fateful presentation, Denning defines a “springboard story” as one which is not aimed at promoting detailed discussion: the story is typically “brief and textureless”. Such stories do have three key characteristics:

- **connectedness:** They “link the audience with a positive controlling idea and a protagonist with whom the audience empathizes”
- **strangeness:** They “violate the listener’s expectations in some way”
- **comprehensibility:** They “embody the idea so as to spring the listener to a new level of understanding”.

Denning argues strongly for making use of the knowledge that already exists in people’s minds, rather than seeking to provide a complete solution. “The necessary understanding is already in the listeners. You just need to enable them to light that knowledge in new and different patterns.” Thus, a successful springboard story accomplishes this by creating a “big picture idea” that strikes the listener “not only as fresh but self-generated.”

**Firestone J (various papers). Available online at: <http://www.dkms.com/> (accessed August 2004)**

*Those interested in the philosophy and practice of knowledge management from the corporate perspective should take a look at the wealth of white papers and other free*

information available on the Executive Information Systems web site, particularly the work of Joe Firestone.

Apart from papers and briefs on enterprise information and knowledge portals, there are a number of papers outlining basic concepts and key issues in knowledge management. Selected papers include:

- **Key issues in knowledge management** (2001). This is one person's view about some of the main issues dividing practitioners on how to pursue knowledge management, comprehend it, and eventually realize its value. The issues covered include: "Approach to KM", "What is knowledge?", "What is knowledge management?", "Hierarchical vs. organic KM", "Knowledge management and data management", "Knowledge management and information management", "KM and culture". Available online at: <http://www.dkms.com/papers/firestoneissuesk1v1n3.pdf>. See also Firestone's white paper entitled "Basic concepts of knowledge management" (White Paper No. Nine, June 1998).
- **Estimating benefits of knowledge management initiatives: concepts, methodology, and tools** (2001). This paper presents concepts, methodology and tools for producing improved KM benefit estimates. It provides a framework for thinking about more comprehensive estimation of KM benefits – an estimation that is tightly coupled to corporate goals and that distinguishes benefits according to their relative importance. Instead of a single methodology, the paper defines an abstract pattern of "comprehensive benefit estimation" (CBE) that achieves the goal of tight coupling of benefits, goals and KM initiatives and competing alternatives. The paper ends by specifying how one may tailor the pattern to achieve a feasible estimation procedure in different concrete situations. See:  
<http://www.dkms.com/papers/kmbenefitestimation.pdf>.
- **Enterprise knowledge portals: what they are and what they do.** (2000). This paper contains the most detailed examination of the Enterprise Knowledge Portal yet. It examines the EKP in light of the Knowledge Life Cycle Framework and specifies the requirement that the EKP support knowledge production, knowledge integration, and knowledge management. Available online at:  
<http://www.dkms.com/papers/ekpb2brev1ppt.pdf>.
- **Approaching enterprise information portals** This nine-chapter, 177-page report treats: EIP definitions, evolution of the EIP, benefits and benefit estimation, portal systems integration and architecture including the special role of intelligent agents (IAs), knowledge management and EIPs, a comprehensive and forward-looking segmentation of the product space, and the future of the EIP product space. For an overview, see: <http://itpapers.zdnet.com/abstract.aspx?compid=3228&docid=3811>. See also Firestone's white paper "Defining the enterprise information portal" (White Paper No. Thirteen, July 1999).

- Two papers focus on measuring and assessing the value of knowledge management: **Knowledge management: a framework for analysis and measurement** (White Paper No. Seventeen, October 2000), available online at: <http://www.dkms.com/papers/eipdef.pdf> and **Estimating benefits of knowledge management initiatives** (Reprinted from: *Knowledge and Innovation: Journal of the KMCI*, 2001, 1,3:110-129), available online at: <http://www.dkms.com/papers/kmbenefitestimation.pdf>.

Gaillard J (1992). Use of publication lists to study scientific production and strategies of scientists in developing countries. *Scientometrics*, 23(1):57-73.

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Johannessen J-A, Olaisen J, Olsen B (2001). Mismanagement of tacit knowledge: the importance of tacit knowledge, the danger of information technology and what to do about it. *International Journal of Information Management*, 21:3-20.

*The paper argues that tacit knowledge is the part of the knowledge base, which is likely to make all the difference in creating and sustaining competitive advantages for companies in an information and knowledge society. Emerging empirical evidence indicates that investments in IT have not resulted in the expected gains in competitive advantage (measured in terms of productivity, continuous improvement or innovation). Companies need to understand the importance of tacit knowledge, focus on organizational learning and on making tacit knowledge explicit through apprenticeship teams, reflection and dialogue. IT can enhance connectivity and the efficiency with which explicit knowledge is shared. Danger lurks in a wholesale focus on and investment in IT, which leads companies to neglect the important role of tacit knowledge. While written for a corporate-sector audience, the paper holds many valuable lessons for organizations of all types.*

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<http://www.eldis.org/static/DOC7446.htm> (accessed August 2004)

**University of Albany Libraries Internet Tutorials. Available online at: <http://library.albany.edu/internet/> (accessed August 2004).**

*This excellent resource covers all aspects of using and searching the web, including basic Internet facts (a brief discussion of the Internet and its components, how to connect to the Internet, questions to ask a prospective ISP), understanding the World Wide Web (a discussion of the major protocols that make up the web, the makeup of URLs, browsers and plug-ins, multimedia, web programming languages and more), a guide to using the Internet for research (a checklist of Internet research tips in a cogent format, with an emphasis on the use of subject directories and search engines, advice on using e-mail discussion groups and Usenet news, and basic recommendations on the use of subject directories and search engines with tips on conducting searches), and strategies for evaluating resources found on the Internet.*

*A significant section is devoted to search engines, subject directories & the "Deep Web" (including Boolean searching on the Internet, the principles of search logic and the different manifestations of this logic on Web search engines). There is an extensive tutorial, covering Google, Ask Jeeves, BUBL LINK, Ixquick and Yahoo! Finally, the tutorials cover major browsers in depth (Internet Explorer and Lynx) as well as specific software of use in research (how to capture graphics from the web onto diskette, and how to use File Transfer Protocol (FTP), a Windows-based software that transfers files between a local and a remote computer).*

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