Choosing Appropriate Equipment and Technology

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Community Multimedia Centre Technologies

Until recently, communication technologies could be broadly divided into broadcasting and telecommunications. Broadcasting was understood to be a one-to-many technology. A central broadcast station transmits a communications signal to many listeners. Telecommunications, on the other hand, was seen as a one-to-one technology, best characterised by the telephone, a device for long distance personal communication.

Now, however, these previously distinct technologies are converging. By combining the characteristics of broadcasting with telecommunications systems, the Community Multimedia Centre (CMC) creates new possibilities for many-to-many communications. The broadcast listener can more easily become a producer of news and information while the Internet provides new tools for group telecommunications.

The CMC incorporates the features of community broadcasting with those of community telecentres. Radio (or TV) studios and facilities for production and broadcast are combined with access to telephone, Internet, email, fax and printing. This is not simply a case of putting different technologies under one roof: the CMC aims to be an integrated broadcast and communications platform.

CMCs come in many shapes and sizes

Choosing the appropriate technology solutions for your CMC will be crucial for its sustainability and relevance to the community. Focussing too much on high technology solutions will require substantial financial and human resource investments, while ignoring modern ICTs will bar your community from taking full advantage of the last decade's striking developments in ICT-based services.

Since CMCs come in many shapes and forms, it is not possible to give 'one fits all' advice on how a CMC should be equipped. In addition, local factors such as availability, quality and cost of electrical power, telephone connection, Internet access, computer hardware and consumables etc., will be key to designing a realistic CMC set up for your community.

In this chapter we give you general advice on how a CMC could be equipped, based on experience from community multimedia centres and telecentres around the world. Weigh this carefully against the actual situation in your community, as discussed below, and then plan for the right mix for your CMC.

While planning your equipment and facilities look for:

- *convenient and accessible location*

- *support for training in media and technology skills*

- *access to Internet, email, telephone and fax*

- *radio (and/or television) production facilities*

- *access to broadcast and distribution systems*

- *costs.*

Choosing your equipment

The choice of equipment and the technical design must draw first on the purpose and the functions of the CMC. In aiming to serve the communication needs of the community you must take account of what is currently available and identify potential barriers to participation such as location and accessibility, literacy and computing skills.

Start small, grow with your abilities and demand

A general rule of thumb that has proved useful is to ***start small***. Give your staff and users time to become familiar with the technology and the relevant services it can offer, and then grow according to the demands of the community. You should also remember that community demands are likely to change so the CMC should be prepared to continuously adapt its profile accordingly.

All ICT equipment should figure in the CMC's business plans and an item should preferably be purchased if there are clear indications that it can generate at least a cost-recovery income for the CMC.

A technical set up for a small CMC

- A FM community radio station (transmission and mixing capabilities)
  See separate section on community radio
- 1 computer (with CD-writer) for management of the CMC
- 1-2 computers for public access
- 1 printer
- 1 photocopy machine
. 1 telephone
. 1 fax machine

Computer network for a medium size CMC

- 2 admin PCs
- 4 internet access/production PCs
- 1 server with storage and back-up system
- 1 printer/copier
- 1 scanner
- 1 CD writer
- 1 cabling and routing

In addition to selecting purely technical equipment, remember that the machines will require a controlled environment sheltered from too much dust, humidity and heat.

Talk with your peers before deciding on technologies

Try finding out about other CMCs, telecentres or schools with computers and Internet access and talk to them about their experience: What works and what doesn't work in their local environment? What are the local computer standards? What is the availability of spare parts and after sales service?

A new CMC will benefit from identifying a "mentor" in a well established centre. By drawing on the mentor's experience and through visits and staff exchanges, CMC staff can become familiar with ICT equipment and procedures before purchasing equipment.

Building and physical infrastructure

Construction and installation of a new CMC should be based on careful technical design and equipment specification to ensure that facilities are suited to their purpose and achieve the best value within the available budget.

The technical design and equipment specification should be prepared before inviting tenders for supplies or building and installation works. This provides better control of costs and allows for comparison between different contract proposals.

Media production facilities, computer networks and communication systems all require specialist technical expertise, which is not necessarily found in one person or company. In addition, building works may need to be adapted to an existing building. A project manager should be appointed to carry out and coordinate, on time, the works within the budget.

On completion of the works, installation of equipment and software, the centre should be thoroughly tested to identify any faults and to agree on how these will be corrected and who will be responsible. Particular attention should be paid to any potential hazards to health and safety such as faulty electrical wiring.
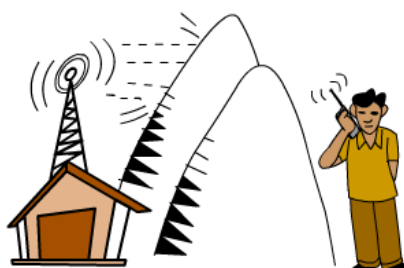
Setting up your community radio station

The sound studio in a CMC is used for radio production, training and broadcast. One studio can perform all three functions but not at the same time. Therefore, many community radio stations have two or more studios. The main studio is used for live broadcasting. The second studio is for training and production but can also be used for live broadcast during routine or emergency maintenance of the main studio.

Should you choose AM or FM?

For broadcast radio a choice has to be made between FM (Frequency Modulation) and AM (Amplitude Modulation). Most radio receivers are capable of receiving both but there are significant differences in their transmission characteristics.

FM radio has a line-of-sight coverage from the transmission aerial to the receiver. Over short distances it provides a clearer and better quality signal than AM, but it breaks up in hilly or mountainous terrain. AM provides more uniform coverage over a wide area but it can suffer night-time interference from distant stations and it is more expensive to install.

At the heart of the sound studio is the mixing desk. This combines the inputs from various sources — presenter microphones, CD players, cassette players, mini-disk players, telephone, etc., and sends a programme output for recording or broadcast. Some studios are self-operational ("self-op") where the presenter speaks and operates the mixing desk and programme inputs. Others have a technical operator to run the mixing desk, while one or more presenters speak to the microphone. Many studios have a separate "talks room" with several microphones feeding to the main studio.

"Self-op" radio studio at Sengerema CMC, Tanzania

Going digital. Radio studios are increasingly incorporating digital technologies and may also have one or more computers for recording, editing, storage and playback. Computer are also used to display scripts and programme running orders for the presenters and can run automated programming at times when the station is not broadcasting live. Studio-based computers should be fully integrated into the CMC network so that digital production and programme preparation can take place outside the main studio.

Protecting your CMC

Attention should be given to the security of your building to avoid fire and other hazards. Do a risk assessment to assess the security of the building and equipment. Alarm systems can be used to prevent intruders and fire. Health and safety assessments should be carried out regularly including electrical checks of all equipment.

You may consider taking insurance to protect against loss or damage due to the above factors.

Location recording. In addition to studio facilities, it is important for a community radio to have portable recording equipment for conducting interviews or reports in the field and for recording music and other cultural activities. A basic field reporting kit consists of a mini-disk recorder, a microphone, a set of headphones, some blank mini-disks and batteries. For more complex location recording, such as a panel discussion or cultural event, a small mixing unit and some additional microphones and microphone stands will be needed.

Suitcase Radio

The Suitcase Radio, a complete broadcast station in a single case and complete with a high gain antenna, is a product of Wantok Enterprises in Canada. The station is fully portable or may be used as a permanent FM community broadcast station. The console portion of the system is ideal for community access to existing networks and is often used by CMCs because of its low-cost, easy-to-use and robust advantage. This radio comes in 30 watt, 50 watt and 100 watt versions. For more information see http://www.wantokent.com

Photo courtesy: C. Arnaldo

Woman technician doing maintenance of Suitcase Radio in the Niger

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Video equipment

Community television is much less widespread than community radio and many more people have access to radio receivers than to television sets. Video is nevertheless a valuable communications tool which can be used to record events, to produce news reports and documentaries, and to assist in educational and cultural work.

The cost of video recording equipment has decreased considerably with the mass production of the digital camcorder and computers can be easily adapted to provide video editing facilities. These developments are bringing video production within the range of facilities which can be realistically included in a CMC.

The basic requirements for video recording are a camera, tripod and microphones. For editing and production, a computer and two large monitor screens are required, together with a high quality video card, plus video editing and production software. Additional software can be obtained to produce titling, sub-titles and effects.

Electrical power sources

Critical to the operation of your CMC is a reliable supply of electricity during the hours when your centre plans to operate, which again should be based on the convenience of the targeted users. When the electricity supply fails, the studios, computer network and most other facilities will come to a standstill. Therefore, plan not only for the main source of electricity supply, but also for back-up systems in the event of a failure.

Power Grid. Where available, a public electricity supply is generally the least expensive option, but not necessarily the most reliable. Note that equipment such as computers and communication gear is very sensitive to power surges; therefore, you should get local advice on the quality of the electrical power provided, how to protect sensitive equipment and maintain steady and uninterrupted power supply.

Alternative power sources. If the power from a public grid is not available or not accessible, you can try to buy surplus power from local schools, hospitals and others.

Other alternatives include installing an oil or gas generator, and solar, wind or water power. Oil or gas generation is cheap to install but expensive to operate and subject to fluctuations in price and supply. Solar electricity requires solar panels which are more expensive to purchase but have very low running costs. Wind or water power are alternatives to consider in locations with high wind or water energy. A back-up generator will ensure continued operation in the event of main power supply failure.

When using alternative sources of power, try to minimise the power requirements of the equipment. For example, a laptop consumes much less power than a desktop PC – while these are more expensive, a solar power set up can usually provide power for twice as many laptops compared to desktop PCs.

Lufo Radio Lamp

Photo courtesy: Serras Technologies
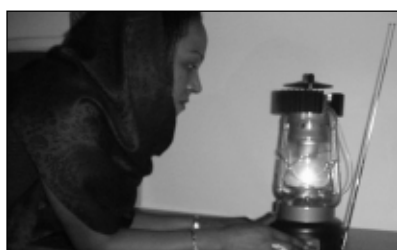
The Lufo Lamp combines an FM radio receiver with a lamp

UNESCO has piloted the use of a novel FM receiver using thermo-electricity made by Serras Technologies in France. Built into the base of a standard oil lamp, the AM/FM receiver is powered by the heat of the flame. A new generation of the Lufo Lamp contains a socket for charging a mobile phone or powering a WorldSpace Satellite receiver. This FM receiver is distributed in wholesale.

The Freeplay wind-up radio with solar panel is robust and requires no batteries. It maybe useful to examine the possibility of funding a distribution of radio receivers such as these to the poorest members of the community for group listening.

For more information see http://www.serras.net/vo/applications/lufo1.asp

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Computer types and usages

Computers are a multi-purpose tool. They are required for office administration functions such as report writing, accounts and database management; they may be used as part of a training facility in ICT skills; they may be available on a free or paying basis for public access to the Internet and email; they may also be used to assist media production including programme research, script writing and sound editing. You need to pay attention to ensure that the number of computers you get and their distribution matches your operational needs.

The computer network should be capable of providing access to the Internet, basic office tools such as word processing, spreadsheets and databases, and appropriate multimedia applications such as digital sound editing, graphic design tools and web authoring tools. In a digital CMC, the computer workstation can act as a media production unit in its own right.

A CMC will often have at least a couple of computers for CMC administration, radio programme production and management, and to provide access to users. There are two main types of computers relevant for a CMC: Intel-compatible Personal Computers (PCs) usually running a MS Windows or Linux based operating system, and Apple machines often running MacOS.

CMC

The two types of computers are similar but NOT compatible and will require different software, different training and usually, service by different technicians. You should choose either Apple or PC according to what is the most common type of computer in the local area and among your partners. Your choice of computer type will influence the price and availability of software and spare parts as well as the possibility for exchanging local ICT-based material with schools and other CMCs.

The second choice with regard to computers is whether to get new or recycled computers. When starting up a CMC, one possibility could be to begin with a couple of recycled computers for basic functioning and training, and later to include additional computers, e.g. a new multimedia PC with audio and video editing capabilities, as required.

Plan for special needs of your users

Access for all is a good motto for a CMC and this requires that you pay special attention to the needs of people who face particular barriers to access.

People with physical disability, especially wheelchair users, can find themselves physically excluded by obstacles such as stairs, narrow doorways or low desktops. Take account of accessibility needs during the building design stages.

People who are blind or partially sighted have difficulty using computer screens without assistance. Specialist text narration software, which reads text and converts it into spoken word is available. Speech recognition software can enable simple commands without typing into a keyboard. Braille print can be used to identify channels on a mixing desk.

Language and literacy is a barrier to the participation of many people, especially women. Traditional cultural barriers also often prevent women from coming forward to participate and make use of the CMC services. Discuss with your community and plan how you can encourage all members of the community to benefit from the CMC. You could train a person who knows sign language to give basic computer training to deaf members of the community.

Training materials should be easy-to-read or made available in audio form in the user languages. Trainers and support staff should be able to communicate with users and to provide support to those whose reading and writing skills are a barrier in the use of computers and the Internet.


New or recycled?

'Recycled' computers are normally second hand computers that become obsolete in certain businesses (for instance banks or software companies) and therefore are sold off at a low price. Recycled computers often continue to perform basic functions such as text editing and Internet browsing, but may be unable to run the latest multimedia software packages and will also have a shorter lifespan than new computers. In the CMC, they can be used for basic training courses while newer computers are reserved for Internet access.

Software programmes, licensing and open source

The software needed for your CMC will depend on the type of computers selected (Apple or PC) and the services offered by the centre.
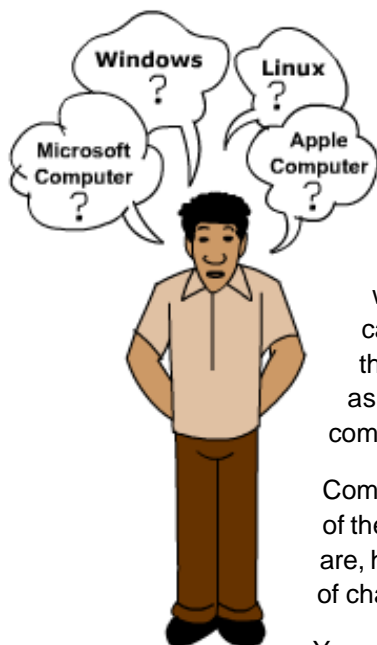
All computers will need an Operating System (OS) and virus protection software. Standard software is now available for text and spreadsheet editing as well as Internet browsing, even if you are not connected.

Proprietary software solutions are expensive and also require regular purchase of upgrades. Free software solutions exist for most requirements but they are not as well known as the leading proprietary software systems. With careful planning and design, free software can meet many of the essential needs. You may need to consult a specialist to assess and install appropriate software solutions on your computers.

Commercial software licenses often represent a substantive part of the CMC's ICT budget. Independent networks of programmers are, however, increasingly making their applications available free of charge in the spirit of sharing and cooperation.

You may like to explore whether commercial packages like Microsoft Office can be replaced by Freeware or Open Source Software (FOSS) applications, but should also be aware that using these packages will often require additional technical skills. You can find more information about Freeware on UNESCO's free software portal www.unesco.org/webworld/portal_freesoft.

A computer network requires specialist assistance for technical design and set up. One computer can act as the gateway to the Internet for a small network of up to 6 PCs. It is better to have a central server for a larger network administration, which includes data storage, back-up system and Internet gateway.

In addition to the desktop computers and a central server, the computer network will need cables, routers and other hardware. You may have some ancillary service equipment such as printers, photocopier, scanner and CD writer. Software will be required for the operating systems and applications on the desktop computers and the central server, including effective anti-virus protection and network firewall.

Proprietary or free software?

A CMC manager should be aware of the advantages of standard, or frequently used, software packages such Microsoft Office, as well as the growing opportunities in using free or open software available in the public domain, such as OpenOffice.

UPS protects your computers

Computers are particularly sensitive to fluctuations in power levels and should be protected by an "uninterruptible power supply" (UPS).

The UPS is a storage device to smooth fluctuations and ensure a steady supply of power. It also provides short-term back-up in the event of power failure, allowing enough time for data to be saved and for computers to be switched off.

Also consider voltage stabilisers to protect the equipment from fluctuations in the power supply.

Networking computers and peripheral equipment

As soon as your CMC plans to have more than one computer, you should consider establishing Local Area Network (LAN). A LAN will enable the users to easily exchange files between computers, share resources such as printers and Internet access and simplify regular backup files. You can find more information on computer networking on the ITrainOnline website.

Wireless networks. Traditional LAN systems established by 'wiring up' computers are being replace by wireless LAN or WiFi technology which is becoming increasingly popular due to its flexibility and ability to network laptop users at a distance. Wireless technology is still more expensive than traditional solutions and can be sensitive to electro-magnetic interference. It has comparative advantages in situations where computers are distributed over a wider geographical area or if the CMC needs to accommodate users with their own laptops.

Introduction to the Internet

The Internet started as a loosely connected research network between large computer centres, but has grown in the last 10 years into a global network connecting every country and exchanging data using a common standard. The Internet provides several services which are relevant for a CMC such as electronic mail (email), the World Wide Web (WWW), file transfer protocol (FTP) and Audio Visual (AV) broadcasting.

The Internet has today become the main resource for information sharing and networking. You can, for instance, find advice on specific CMC or telecentre topics by posting a question on the Telecentre-L discussion list (http://www.idrc.ca/pan/telelib.html) to identify and connect with peers in other countries or research topics relevant for your community in making use of Internet search engines such as Google (www.google.com). The Telecentre-L discussion list is hosted by the Canadian International Development Research Centre (IDRC).

Types of Internet connectivity

Where telephone lines are available these are generally the cheapest and most reliable means of providing Internet connectivity as well as telephone and fax connections. In some areas digital telephone exchanges allow for a Digital Subscriber Line (DSL) which is a faster, permanent connection to the Internet. For areas without landline telephones, and for distances up to 200 km, terrestrial wireless systems can provide a means of connection to the nearest Internet point-of-presence (POP).

For more remote locations, satellite is the alternative. Satellites can be mobile or fixed. Fixed satellite for interactive or receive-only communications is known as VSAT (Very Small Aperture Terminal). It is increasingly the system of choice for remote access; however, licensing arrangements remain a barrier in many countries. Mobile satellite systems such as Iridium and Inmarsat are more expensive solutions.

Internet access will often be a crucial factor for your CMC's telecentre component. The various technological solutions for connecting to the Internet follow a similar pattern — the CMC connects to an Internet Service Provider (ISP) that has a high-speed connection to the Internet. See the diagram on connecting the CMC to the Internet.


Internet for the CMC

Internet connection is increasingly important for running a FM community radio as well as for sharing audio files and obtaining information and programming from a wide variety of sources.

You can use the Internet for sharing experience within and outside the community and for obtaining relevant training programmes.

Many CMCs have a policy on use of the Internet that bans users from accessing pornography on-line. This is because it exposes children who may be using the centre and discourages women from using the CMC.

Main methods of connecting your CMC to the Internet
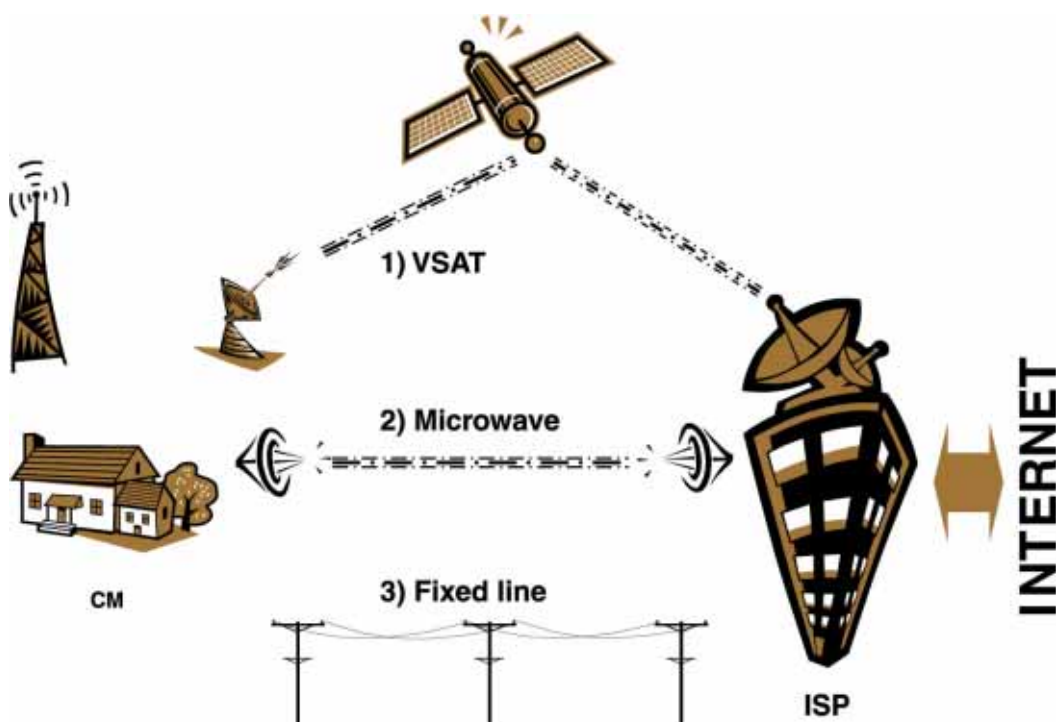
Fixed line connection. Obtaining a dial-up connection to a local Internet Service Provider will often be a first step if your local area has a well-functioning telephone system and a 56 KB/ Sec (Kilo Bit per Second) telephone modem. This will get your centre 'connected' and will allow you to network with other CMCs and exchange advice and experience.

Email, web browsing and access to online distance education programmes can be accessed through the Internet. In a growing number of urban areas, it is possible to upgrade a telephone modem connection to an ISDN, wireless, or DSL /ADSL, connection that offers high speed access allowing video/audio streaming and browsing for many more users (see below).

	Telephone modem	ADSL/DSL
Data transfer rate	33-56 Kilo Bit/Sec	Scalable from 256 Kilo Bit/Sec to 1.5 Mega Bit/Sec
Scenario 1: email	3-4 users can browse and check emails	20 users can browse and check mail
Scenario 2: multimedia	1 user can access multimedia content	6 users can access multimedia content (with a 512 KB connection)
Scenario 3: audio streaming	Not possible	Audio streaming (broadcasting over the Internet)

Internet connection via satellite (VSAT). A VSAT is often the only alternative where no fixed telephone line access is available,. There are various satellites and services ranging from a limited email exchange (e.g. VITASAT) to commercial broadband upstreaming and downstreaming.

As satellite bandwidth is often more expensive than terrestrial bandwidth, this option is usually only viable when there is a large centre and there is no other means of connection. Satellite links may also incur licence fees. In some countries usage of VSAT is only permitted by licenced telecom operators.

Microwave and WiFi links. CMCs can establish a microwave or WiFi link to a local Internet Service Provider or partner connected to the Internet. These links are, however, dependent on the local landscape, as they require a clear line of sight between the two points of communication. Maximum distance for a microwave link in optimal conditions is 50 kilometres, while a WiFi link is limited to 25 kilometres. Like satellite links, microwave links may also incur a licence fee if they are permitted.

Equipment maintenance

The profile and specifications of new equipment should be recorded as soon as installed. This includes equipment type, serial number, purpose/expected usage, computer set up, and the names and versions of software packages installed.

Maintenance procedures are necessary to assure that the equipment continues to work optimally and to reduce equipment downtime to a minimum. ICT equipment should be checked regularly – e.g. once a month – to verify that it is functioning correctly. The result of the maintenance test should be added to the specific equipment's profile.

Problems in ICT equipment are often recurrent so it will be a good idea to store the equipment profile in a spreadsheet or database format. The history of each piece of equipment should be recorded on a continuous basis, including faults that have occurred and how these were resolved.

Basic maintenance checklist for a public computer

Before switching on the computer

- *Are all the computer parts present and correctly connected? (CPU, monitor, keyboard, mouse, speakers etc)*

- *Does the computer look clean and inviting?*

- *Is the working environment around the computer clean and functional?*

After switching on

- *Does the computer start up correctly?*

- *Are any errors or warnings reported at start-up?*

- *Is the monitor functioning correctly?*

- *Is the keyboard usable?*

- *Does the mouse work smoothly and correctly?*

- *Print a test page of text to test the printer*

- *Do the main software applications on the computer start up correctly?*

- *Is there any new unauthorised software installed on the computer?*

- *Are the computer virus definition files current?*

- *Scan the computer for computer viruses and note result*

Switch off the computer

- *Verify that the computer closes down correctly.*

Safeguard electronic assets and perform regular safety backups

You will be able to process and store information such as the users database, training materials and the centre's accounting in electronic format when using computers to manage the CMC and ICT based services.

The electronic format offers many advantages with regard to access, sharing and processing but also has the disadvantage of being deleted by mistake or lost because hardware of failure, or theft. It is therefore crucial to take appropriate precautions to avoid losing important and irreplaceable data.

Photo courtesy: Habby Bugalama

Sengerema Telecentre Manager services a PC at the centre

Support and maintenance

The technical facilities of a CMC require people with technical skills to provide maintenance and troubleshooting. The computer networks, hardware and software require network administration skills. Electronics know-how is needed for media studios. Broadcast systems require knowledge of radio frequency engineering.

It is not always easy to find an individual technician with all of these skills. Training may be a solution. Alternatively, some or all of the technical support may be provided by an engineer on-call. For some critical equipment, such as the radio transmitter, a back-up system is necessary for emergency or routine maintenance.

Safety Backups. All important files such as the CMC user database, inventory, or correspondence should be backed up regularly, at least weekly, on a removable device e.g. a rewriteable CD Rom. The backup should then be stored in a safe place, or in a different location.

If a key file is deleted or corrupted, it can then be restored from the latest backup copy.

Safety copies of original CD Roms. Commercial licensed software often represents a considerable investment by the CMC. Make a copy of original CD Roms and keep the originals in a safe. Use only the copies in the centre so that your original CD Roms are protected against wear and tear as well as misplacement and theft.

ICT troubleshooting at the CMC

There are some simple steps you can take before calling a technician in case of malfunctioning equipment in the CMC. Structured troubleshooting will often save the expense of a technician and will avoid lengthy periods of downtime.

Weekly safety backup procedure

- Prepare 5 rewriteable CD Roms and name them 'Backup Week 1', 'Backup Week 2, etc.

- Store all critical and regularly updated files on the same computer and in an organized structure in subfolders under a main CMC data folder.

- At the end of each week, copy the CMC data folder and subfolders to the corresponding CD Rom: In the first week of the month copy the data to the CD Rom named 'Backup Week 1', in the second week copy data to 'Backup Week 2' so that all the CD Roms are used once every month on a rotating basis. Depending on the amount of backup data, you may choose either to clean the CD Rom before its next usage or store old backups from the previous months.

- After performing the weekly safety backup, place the 5 backup CD Roms in the CMC safe.

- Once every month the designated person should copy the latest weekly backup e.g. 'Backup Week 4' to a normal CD Rom and store this disk outside the centre – e.g. at the home of the manager. This will assure that your CMC's data is completely safe from fire or looting.

3 basic steps for troubleshooting	
When a technical problem is observed by staff or reported by users, then	
Step 1	• Identify the nature of the problem • Can the problem be tracked to a single piece of equipment? • Is it hardware or software related?
Step 2	• Check the maintenance file and see if the problem occurred before. • What solution was used the first time the problem occurred? • Can CMC staff correct the problem? • If the problem is hardware related, check all the power and network/cable connections.)
Step 3	• Contact the service technicians and ask for advice if the problem can't be solved by the CMC. • Note down in the maintenance report the advice and action taken.

There is much advice to be found on the Internet on all kinds of technical problems. However, the advice on the Internet comes without guarantees and you should NOT apply any radical solutions without having first consulted a local IT technician.

Protecting your system from computer viruses

Computer viruses have become a daily hurdle to all computer users. A computer virus is a software programme that propagates itself from computer to computer via networks or on shared media such as CD Roms or floppy diskettes. A computer virus can, when activated, take control of the host computer, delete personal or system files, send information about your system to intruders on the Internet and cause hardware breakdowns. New viruses are being developed daily at an increasing rate.

WorldSpace

The WorldSpace satellite system provides digital broadcast of audio and multimedia content to Africa, the Middle East and Asia. This system is particularly interesting for CMCs; you can receive more than 30 audio channels of digital quality, music, news and education programmes with just a digital radio receiver and a multimedia adapter. With authorisation, the programmes can be rebroadcast in FM by the community radio station and multimedia content such as teacher training materials can be accessed from your CMC's computers.

Some centres have established a local Internet-like service where their users can access multimedia-based news, training materials etc., provided via the WorldSpace multimedia service.

Computer virus attacks can often be prevented by:

1) installing and frequently updating anti-virus software on all computers

2) encouraging computer users to be vigilant when introducing new files on a CMC computer, either through opening email attachments or other channels

3) discouraging the use of floppy diskettes except on machines with the latest virus checking software

4) choosing an ISP which blocks viruses on the server.

See the *How Stuff Works* website http://computer.howstuffworks.com/virus.htm for further information on computer viruses.

Anti-virus software components

Anti-virus software provides protection against viruses.

A typical virus protection system for a user computer consists of two parts:

1. A main programme consisting of a virus search engine that can identify and remove computer viruses

2. Virus definition files containing virus characteristics and removal methods.

As new computer viruses continue to appear the virus definition files will have to be updated frequently to assure that your CMC's computers remain protected.

> **Some tips**
>
> - Administrative systems should be in place for logging technical faults as soon as they are reported.
>
> - Faults arising from misuse can be reduced by monitoring access to equipment.
>
> - Ensure that users have proper training before using equipment.
>
> - Central servers and transmission systems require access by specialist staff only.
>
> - Public access computers should be regularly cleaned of data and have their software reinstalled.

Training of staff and identification of training materials

Staff training is important for successfully applying new ICTs at any CMC. The staff and volunteers need to have confidence in applying the new equipment in their daily work, e.g. radio programme editing. Staff must also be able to introduce the community to ICTs. Therefore, good training and reference materials are very important. Training materials and training courses are increasingly available on the Internet. A good place to start is the ITrain Online website where international NGOs and UN agencies are making quality training materials available free of charge.

See References at the end of this chapter for details.

See also the chapter on Training in this Handbook.

Look before you leap!

This chapter provides a general guide to technology issues for CMCs. There is no one-solution-fits-all model and you will need to make technical choices according to your particular circumstances. Take the advice from a specialist before taking the final decision to invest. Advice can often be found at a neighbouring radio station or nearby telecentre, or use the Internet to contact an established CMC.

References

www.itrainonline.org/itrainonline/english/networking.shtml

*Wireless Fidelity, using the unlicensed radio spectrum in the 2.4Ghz and 5.8Ghz wavebands. More information on WiFi is available on **http://www.wlan.org.uk** or **www.sown.org.uk** or **www.wlug.org.nz***

*Volunteers in Technical Assistance (VITA) is an international NGO with over 40 years experience responding to the information needs **www.vita.org/leo**)*

'Upstreaming' refers to data transfer from the Centre to the satellite and 'downstreaming' to data transfer from the satellite to the Centre. See, for example, **www.swan-informatique.com** or **www.iwayafrica.com; www.geolink.com; www.worldspace.com**

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