



YES Campaign Newsletter

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A Monthly Newsletter Devoted To
Highlighting Critical Concerns

This Month's Theme

ICT IMPACTS
YOUTH
EMPLOYMENT

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Back Ground Info On ICT

Information and Communications Technology includes a wide range of hardware and software, and supportive knowledge and ideas.

A computer is a machine designed for the input, storage, processing, and retrieval of information. ICT includes of general purpose and limited purpose computers and computerized devices. It includes connectivity among the devices and with people. It includes:

- ✎ Full range of hand held, restricted purpose computers that we call calculators.
- ✎ Full range of general purpose and restricted purpose computers.
- ✎ Connectivity
- ✎ Software
- ✎ Databases, including the Web. One way to think about a computer is that it a library storage device that can be specifically designed to aid in the storage, the manipulation, and the retrieval of information -- sort of an "automated" library; a library with some intelligence.
- ✎ Information appliances. Embedded computers.
- ✎ Handheld communication and computing devices, ranging from cell telephones to wireless telephone-palmtop computers.

Here are two really important aspects of ICT:

1. Effective Procedure (Can also be called a Procedure.)

An Effective Procedure is a detailed step-by-step set of instructions that can be mechanically interpreted and carried out by a specified agent, such as a computer and/or or automated equipment.

Procedural thinking includes developing, representing, testing, and debugging procedures, and using them to solve problems and accomplish tasks.

The concept of Effective Procedure lies at the very heart of the field of Computer and Information Science (Computer Science). Two points to make:

An Effective Procedure may or may not accomplish its intended goal. (This is a place to insert the ideas of an algorithm versus a heuristic.)

The theory and practice of developing, testing, and "proving" Effective Procedures is quite mathematical in nature.

For many years, we have been in a trend toward students learning less about the development and use of Effective Procedures, and of procedural thinking.

From a math education point of view, one of the things we want students to learn to do is to identify reoccurring and repetitious tasks that they are carrying out as they work to solve a mathematics problem or accomplish a mathematics task. The chances are that a calculator or a computer can be used to help automate this activity, doing it both faster and more accurately.

2. Human-Machine Interface

A "good" interface saves a lot of time and effort on the part of the learner/user.

We all understand the significance of the development of the graphical user interface (GUI) that includes the mouse.

We are just at the beginnings of routine use of voice and virtual reality as part of the human/machine interface

Understanding ICT's Impact On Labour Markets

Information and Communications Technologies (ICTs) have dramatically reshaped labour markets around the world. Social inequality within and between countries has increased and young men and women have tended to bear the brunt of this. The number of unskilled, semi-skilled and entry levels jobs in a wide variety of sectors have declined.

Large organisations in both the public and private sectors have shed millions of positions. For young people this has resulted in stubbornly high unemployment levels, in most countries these are locked in at rates many times above national unemployment.

ICTs have been extremely important in generating two strongly diverging forces for the world's workers.

They have contributed to the automation of processes making some workers redundant and closing off jobs many young people could have expected to begin their careers; and Changed the economics of many sectors reducing the importance of scale, so facilitating an upsurge in employment in Small, Medium and Micro-Enterprises (SMMEs).

Where young people, with the benefit of a good education and training foundation, could have once expected to have a job for life this is no longer the case. But if that education and training is in ICT-related skills, and if they demonstrate enterprise and resourcefulness there are vast opportunities.

ICT: A workplace issue

Technological drivers

Ubiquitous computing is a logical consequence of the continuing exponential trend of miniaturisation. As predicted by Gordon Moore (co-founder of Intel), the processing power of silicon chips has been doubling for the same cost roughly every 18 months and seems certain to do so for at least the next decade. This, combined with other technical advances means that devices are becoming smaller, lighter and more powerful, which in turn means that it becomes easier to interconnect devices seamlessly.

These and other trends, such as development of new materials, display technologies and 'smart' textiles, are enabling technology to be embedded in almost anything – cars, phones, even clothes. According to Bill Gates:

'As people find more ways to incorporate these inexpensive, flexible and infinitely customisable devices into their lives, the computers will gradually "disappear" into the fabric of our lives.'

At the same time we are also seeing a convergence of technologies – between computing and telecommunications, and also with broadcasting and publishing. Digital technologies allow all forms of information – voice, data or video – to be manipulated across all types of devices and networks. It is increasingly difficult to discern the difference between a computer and mobile phone, for instance.

A world characterised by ubiquitous computing, ubiquitous communication and intelligent user interfaces begins to make possible a world of ambient intelligence. By that we mean a distributed network of hidden intelligent devices that is aware of our presence and is able to respond to our needs and emotions.

Economic drivers

Not only are computers becoming more powerful and smaller and less power-hungry but they are also becoming much less expensive, making it possible to build computing power into everyday devices as we have described.

The cost of communication is also falling and some forecast that this trend will continue so that soon they will be 'near zero'. We have already seen some of the effects of 'the death of distance' – a transatlantic telephone call can be cheaper than a national call in some countries.

While technological innovation is undoubtedly responsible for falling communication costs, the liberalisation of markets and increased competition is also adding more downward pressure on costs and prices.

Businesses are facing an increasingly competitive environment and in order to succeed they need to run their operations as efficiently and cheaply as possible. This is an important driver of the development and take-up of new applications.

Of course, technological advance and the roll-out of new services depends on the availability of finance and the attractiveness of the sector as an investment opportunity. The dot.com crash, the cost of third generation 3G mobile licences and the general downturn in the stock market have meant that investors are currently more interested in real returns on their investment. The risk and uncertainty of investment in ICT will undoubtedly influence the speed of development.

Social and personal drivers

An important driver of ICT development is the issue of time. Time is an increasingly valuable resource for individuals and families, as well as employers. Everyone wants to use their time more effectively, and information and communication technologies enable that to happen. People expect more and more services to be available 24 hours a day and business has to respond. We now do business 'at the speed of light' and we even talk about 'Internet time': only those organisations that innovate in the space of weeks or months will capitalise on new opportunities.

Technology gives people a greater ability to choose how to live their lives. Electronic choices allow individuals, families and communities to be more self-reliant and this is a powerful driver of change. The Internet and mobile phones mean people can increasingly control where and when they work.

Put more broadly, consumer demand for communication, information and entertainment services will be an important driver for ICT developments. Of course, value for money is a key component of demand – the attractiveness of viewing videos on a handheld device while on the move, for example, will depend partly on the price.

The take-up of services will also depend on personal and social acceptability: will it fit in with the way people wish to live and work? So, for instance, talking on your mobile phone on the train has been accepted despite the imposition on other passengers – but the future would look very different if it had not been. Perhaps ambient intelligence, for instance, will be so foreign that people will not accept it. Or maybe technologies will become so flexible that it will be possible to customise them to individual needs so that acceptability will not be an issue.

There are undoubtedly many obstacles on the path towards the information society that need to be dealt with. These include issues of trust and security, ownership of intellectual property, privacy protection, unsolicited email or spam, and the protection of children from 'harmful' content. The issue of regulating the Internet is a thorny one requiring a balance to be struck between freedom of expression and protection of rights.

The issue of access to information will also affect the way the information society develops. While we all want an 'information society for all', the alternative is a world of information 'haves' and 'have nots' – a world in which the opportunity to participate and benefit fully are determined by factors such as income, education, geographic location, age and gender.

Successful ICT Project

Bangladeshi ICT Infrastructure Initiatives

Bangladesh ranks as one of the poorest countries in the world and this is also reflected in its information infrastructure. In 1996 it had only three phone lines for every thousand people, compared with an average of 11 for other low income countries and more than 500 for high income nations (World Bank 1999). Since then the position has significantly improved through a combination of innovation, liberalisation, local enterprise and new technologies. Examples include:

Individuals, all over the country, have set up kiosks converting their telephones into Public Call Offices (PCO). These kiosks provide computer-related services, fax, email etc. Private entrepreneurs are providing PABX connections to willing subscribers, where the Bangladesh Telegraphs and Telephone Board (BTTB) is not able to provide lines at present.

More homes have cable TV connections than have telephones. These services are provided by private operators with satellite base stations. These cable connections can also provide high-speed data connections.

The BTTB provide direct in-dialling facility from urban areas to the operators of the rural manual exchanges. With this arrangement, all the telephone subscribers from home and abroad were able to dial directly to the rural manual telephone exchange operators who connect them to the local telephone subscribers.

Bangladesh franchised basic rural telecommunication services about a decade ago. This has been achieved through innovative revenue sharing arrangements between the incumbent dominant operator and the fledging private operators.

Private sector Telecom Operators of Bangladesh provide have developed an innovative approach to build a cellular mobile pay phone service on villages around the country. A village woman, chosen by the people living in the area, receives a loan from the Bank to finance the purchase of a mobile phone. She then uses it as a mobile pay phone and resells the service to the people of the village at a small premium. She clears the telephone bills and makes repayments to the Bank each week.

Bangladesh Railway has put a Fibre Optic Cable Network beside its railway tracks which cover an extensive area of Bangladesh. Grameen Phone Limited (GP), a licensed Cellular Operator, have taken this cable on lease and upgraded it. This has provided GP with a ready-made transmission network across Bangladesh.

Technology aspects

Some areas of technology have been found to be of particular importance to domestic research and industry. These technologies represent either areas in which the country has particular strength or possible areas in which the country lags behind but which are deemed important for future competitiveness. Findings for selected national studies, referred to as 'established industrial countries' by the FISTERA report, are shown in the Table below:

: ICT priorities in selected national foresight exercises

Type of technology		Germany	Sweden	United Kingdom
Enabling research		'Sociomics' ¹ ; DNA and quantum cryptography ² ; Computational neuroscience; Systemic biology.	Systems science	Maths, physics; Computer theory; Software engineering.
'New generation'			ICT and biotechnology converging; Molecular electronics.	Optoelectronics; Grid computing.
Existing technologies	Hardware	Human-machine interaction; Mobile devices; Visualisation and display techniques; Energy supply.	Mobile telephones as a 'mainstay'; Human-machine interface.	Powerful portable PC; Advanced visualisation and displays; Data storage and maintenance; Low power devices.
	Software	Information logistics; Software agents; Computer simulation.	Simulation; Modelling; New methods.	Reliable and flexible software; Creative industries: content provision, design skills and computer games.
	Systems	Embedded systems; Microsystems; Networks.	Networks; Convergence of media; Greater bandwidth; Autonomous systems.	Broadband; Mobile and radio networking.

¹ 'Sociomics' is mentioned as a new direction of research in the area of autonomous software agents, including robot systems.

² Both technologies are related to security: DNA cryptography is based on molecular biology and quantum cryptography provides means for two parties to communicate over a private channel in complete security.

Source: Adapted from FISTERA, April 2003

Relevant Questions Young People Should Be Thinking About

International Labour Organisation's Prescription For Tackling Youth Employment

Creating Guaranteed Electronic Markets

A feature of almost every e-commerce initiative currently being developed is that their proponents plan to colonise and control at least one component of the market segment they have targeted. There are very few examples of open electronic markets that have been established by disinterested individuals or organisations. Guaranteed Electronic Markets (GEMs) have been conceived as entirely open e-markets modelled on public utilities. The critical component of a GEM is the guarantee which is underwritten by a central authority, in much the same way governments underwrite the value of their paper currencies.

The GEM itself consists of a series of databases which contain information about products or services available for hire or sale. A potential user can scan through the various providers and determine their location, cost and the number of satisfactory transactions they have been involved in with other GEMs users. When the two parties have agreed on the timing and terms, the purchaser pays the agreed price to the GEMs. Once the task has been completed, and assuming there is no dispute about the quality of the service from the purchaser within a set period, the service provider is paid by the GEM, minus a service fee.

The guiding principles under which GEMs operate are that:

- ✎ each transaction is thoroughly enforced;
- ✎ market conditions are structured around the needs of buyers, rather than favouring particular sellers;
- ✎ the system is committed to simplicity of operation for users and keeping overheads low;
- ✎ the GEM stands alone, divorced other vested interests;
- ✎ the system has no purpose other than provision of electronic markets; and
- ✎ the system has automatic protection built in for users.

The GEM concept addresses the potential for SMMEs to take advantage of e-commerce to expand new businesses and to expand those businesses already operating. In common with the Localised Electronic Markets mentioned above, GEMs provide an open mechanism which will enable smaller companies and individuals, which are otherwise largely constrained in developing a viable online presence, with an avenue to establish themselves. For young men and women especially co-operative and accessible initiatives such as these offer great potential to provide a framework in which micro-businesses can be encouraged to generate employment in the online economy.

Creating Electronic Produce/Product Exchanges

Whereas Localised Electronic Markets and Guaranteed Electronic Markets are primarily internally focussed in addressing some of the issues raised by global e-commerce, Electronic Produce/Product Exchanges (EP/PE) concentrate on using these technologies to tap into distant markets. Just as in the past producers and small manufacturers have attempted to reduce their costs and to gain greater control over markets through pooling their resources to operate packing sheds or trucking operations, ICTs can offer the same opportunity today. An EP/PE would provide information on:

- ✎ supply side inputs, such as the availability of sources of finance, labour and expertise, raw materials and technology;
- ✎ demand side inputs, market opportunities, prices, size of markets, quality; and
- ✎ environmental conditions, competitors/market intelligence, legislation.

The EP/PE is trading in agricultural produce but the concept could be applied to a wide range of products. The EP/PE has two main elements: the technology and the management and marketing infrastructure specific to the product or industry.