TECHNOLOGY CONVERGENCE
THE HUMAN PERSPECTIVE

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*C*ONVERGENCE *in technology is understood by common man in terms of the ability of different network platforms to carry essentially similar kind of services. It could be a massive interconnection of digital technologies. The connection could be with wires or wireless (e.g. blue tooth etc), voice or data, terrestrial or space, the goal is to connect and connect with purpose of sharing information. All our different medium of various information technologies, has the transmission and manipulation of information, as their common purpose. Now-a-days, the radio and television broadcasts are now feasible via the internet over telecommunication networks and internet services possible through satellite, cable and terrestrial television broadcast networks.*

Today, convergence is most often discussed in terms of the technologies used in computers, television, and telephony. Digital technologies cover a range of disciplines generally associated with the computer and telecommunication industries – digital microelectronics, software and digital transmission. Digitalization of telecommunications and computer equipment has broadened the existing technology base and facilitated the emergence of large-scale communication networks that carry voice, data and images. As computers were increasingly accommodated within those telecommunications networks, previously existing technological and market boundaries became vague.

Technologies and industries are converging to offer more and different information through what were once divergent communication channels. Digital convergence is already provoking a major upheaval in the industries involved in information, communications and media. Convergence is also leading to the dissolution of traditional industry boundaries. Once digital television technology is common, the collision centers around bandwidth and carrier capacity.

Sociologists are already wondering what effect convergence and its by products will have on society. The technological convergence has put many questions in regard to regulations, employment, training and education, which need careful attention of governing bodies. The chaotic nature of the change in progress exacerbate fears that the global information society will be polarized, fragmented, or even "atomized". There is growing fear in individuals that in future they will be forced to struggle for survival in an increasingly electronic environment. And the survival mechanisms which have been developed in recent decades, such as relatively stable employment relations, collective agreements, employee representation, employer-provided job training, and jointly funded social security schemes, may be sorely tested in a world where work crosses borders at the speed of light.

The human being, ultimately for whom all this technology is meant for, must not be neglected for sake of advancements. The basic aim or objective in all these advancements needs to be aimed at making the life beautiful and easy. Not the other way, where the life is more complicated, arduous and devoid of feeling or touch.

The Context
The history of mankind speaks about the significant role played by industrial and technical revolution in changing the facet of human being from stone - age past to present day civilized society. The Human being, the best creature of God, blessed with the God's most powerful gift – the human brain, long ago, while interacting with nature realized the power of systematic thinking. The ever-continued process of thinking and experimentation

with the nature, led to innumerable scientific breakthroughs in divergent fields. Application of these, in course of time, gave shape to industries, which, in turn started changing the life style of human beings and economy of the society. The needs multiplied and so too the efforts towards more research and improvisation of technology to fulfill those needs.

The present day advancement in technology before us is a result of chain of pain staking research and improvisation process. It is reflected as "sophistication" everywhere – whether it is office automation, household appliances, multimedia and entertainment gadgets or medical equipment where "connectivity" and "touch of a button" ensures the compliance of desired process. This "sophistication" is because of the "*convergence*" of technologies, which in simple terms can be best visualize in following questions (Tanglang):

> '*Do you think Alexander Graham Bell envisioned people using wireless phones to view video clips? Do you think Guglielmo Marconi envisioned people listening to "radio" on their computers, thousands of miles away from where the sounds originated?*'

These questions highlight the power of convergence, the intersection of broadcasting, computers, telephones, video and more. All our different medium of various information technologies, have the transmission and manipulation of information, as their common purpose. With the discovery that all information, whether sound, pictures or raw data, can be converted into digital format (ones and zeroes) and recomposed intact somewhere else, our different media are shedding their separate identities and coming closer together. The radio and television broadcasts are now feasible via the internet over telecommunication networks and internet services possible through satellite, cable and terrestrial television broadcast networks. And with that convergence, "information" has been given a life of its own, separate and distinct from the medium, which carries it.

A generation ago cellular telephones, email and handheld computers belonged, if not to the realm of science fiction, at least to something very sophisticated and very distant. Today, they are the most common and widely used tools.

A major transformation of the world economy occurred from agricultural based to industrial one in 1940s-50s. This is now undergoing another major transformation - from industry based to an economy that exists around creation, manipulation and sharing of the information. There are various ways to describe the new economy, which is emerging as a result – the digital economy, the network economy, the information based economy etc. The digitalization of information processing and delivery is transforming the way the financial systems operate, the way enterprises exchange information internally and externally, and the way individuals work in an increasingly electronic environment. These changes are important not only for their immediate economic and social impact, but also because they are taking place at the formative stages of the information economy, in which information will not merely be a resource, but the very basis on which the economy will grow. The knowledge based industries, such as today's entertainment and mass media industries, will be among those, which surge to the forefront of tomorrow's economy.

Major telecommunication firms are expanding their core businesses, while they are downsizing their own workforces. And, at the same time, thousands of medium-sized, small or even micro enterprises generate much of the content and much of the new employment in this information industry. Virtual enterprises composed of employers and workers linked to one another only by computer communication are expanding globally. Thus bringing about increased productivity, new opportunities, new jobs and infinite scope of growth, both in developing and developed countries alike.

Internet is one of such example. It has evolved and simultaneously entered our everyday lives at dazzling speed. What began as a simple text interface has blossomed into a fully visual medium that can satisfy our desires for video, audio and more.

> *The connectivity provided by technological convergence takes on a broader meaning than simply putting two or more people in touch. The Internet creates a new universal space for information sharing, collaboration and commerce. It provides a new medium that takes the immediacy and spontaneity of*

technologies such as TV and phones and combines them with the depth and breadth inherent in paper communications. In addition, the ability to find information and match people with common interests is completely new.

Bill Gates, Founder, Microsoft Corporation (Gates, 1999)

The unprecedented growth seen in the computer and telecommunication technologies in recent past is leading to a point where both the technologies are "converging" by breaking old barriers, and this convergence has started making a great impact on various industries, regulatory authorities, the society and above all on the people. Undoubtedly, technological convergence has benefited the society in many ways – glimpses can be seen in some of the examples – the financial information are available to businessmen anywhere, anytime, helping them to make speedy decisions – thanks to wireless Internet connection. The availability of minutest technical details of components on Internet – helps in making orders on Internet and item can be delivered within hours. Connectivity to remoteness ensures best medical advice available to the person, who is in need of it. There are many examples where, robots – controlled and monitored by specialist overseas, perform complicated operations. Latest information is available to students of school, colleges and universities over Internet, to the laboratories where scientists involved in deep research activities. According to one survey, it has been estimated that more than half of the total GDP in the rich economies is produced in knowledge based industries, such as telecommunications, computers, software and entertainment (Tapiola, 1997). Wealth, power and strategic advantage are liable to accrue to those nations and companies, which are able to master the forces of technological change and draw maximum benefit from a rapidly global economy based on information.

As Bill Gates has rightly said that "The most meaningful way to differentiate your company from your competition, the best way to put distance between you and the crowd, is to do an outstanding job with information. *How you gather, manage, and use information will determine whether you win or lose (Gates, 1999).* The winners will be the ones who develop a world – class *digital nervous system* so that information can easily flow through their companies for maximum and constant learning."

> *"In a global, competitive market where information transfer is measured in nanoseconds, companies that beat the odds are those that learn faster, act quicker and adapt to change sooner"*

– PWC Telecom insider (Lauks)

However, the wide applicability and new solutions provided by "technological convergence" is coupled with new problems (Reports & Accounts, 1995). Some of these are the need to ensure the security of commercial operations and financial transactions, protecting the intellectual property rights, reconciling the freedom of expression with the enforcement of legality where the network is accessed. In addition, there are many questions raised (Multimedia Convergence, 1997) : *Will employment in the future necessarily become more precarious? Where will the new skills come from? How can firms be assured of finding the skills they seek? How can workers be sure that the skills they acquire will actually prepare them for the job market? How will education and training needs be met as skills requirements continue to climb with every technological breakthrough? Will virtual enterprises become the norm? What will be the future of labour relations when close partners are physically located at great distances from each other, communicating and sharing their work in real time in an electronically mediated environment? What kind of universal labour standards are appropriate as work profiles become even more highly individualized?*

Pundits tell us that we are heading for an information society that may be polarized between information haves and have-nots. Signs of polarization are already evident, both between nations and within them. Sweden has 68 telephone lines per 100 inhabitants. The least developed countries have less than one line per 100 (Tapiola, 1997). How can this gulf be narrowed? Personal computers and fax machines have become ubiquitous in the business world but tend to be present only in the better – off households. How can universal access to the tools of the information economy be assured? Will we be forced to accept two tier societies in which good employment, income and wealth coincide with access to information and communication, but where those without access are left, at best, in a secondary role and, at worst, dropping out of the margins? All these need attention of government, regulatory authorities, labour organization etc.

"For all the stunning capabilities of the Global Information Infrastructure, we must remember that the heart of it a way to deepen and extend our oldest, and most cherished values; rising standards of living and literacy, and even widening circle of democracy, freedom and individual empowerment."

Al Gore, erstwhile Vice President of the United States of America (Gore, 1997)

So, while putting efforts in making use of information technologies for the development of economy and nations, the countries need to put people in the information age and plan for using it for enrichment of people and their life standards.

Before assessing the *human perspective* of technological convergence, the following sections will deliberate about the "*convergence*" in broader terms and "*technological convergence*" in specific terms.

Convergence

Defining Convergence

The term convergence eludes precise definition, but it is most commonly expressed as the ability of different network platforms to carry essentially similar kind of services. For some, it is a massive interconnection of digital technologies; the connection can be wire or wireless (e.g. blue tooth etc), voice or data, terrestrial or space but the goal is to enable all technologies, from the kitchen appliances to the data server in any university. Simple connection is not sufficient, connection with purpose, with speed and accuracy is, what is essential. To some, the goal of convergence is to convert everything recorded by humanity – text, video, sound to streams of digital bits and make it readable, seeable, and hearable world – wide. Hence, convergence implies a world in which people are not denied access to any ideas or visions that have been written, photographed, painted, spoken or performed. Some even look at convergence and see people connected to each other. For these proponents of convergence, its essence is the freedom to interact with people electronically but on a personal level.

The most often cited in the popular press is the coming together of consumer devices such as the telephone, television and personal computers. How it become possible is best understood by the statement made by Jeffery Mackie Mason (Jones)**,** an Associate Professor at the University of Michigan, "Once everything becomes digital, transporting one form of content is no different than any other."

The concept therefore revolves around following products/services:

- Services previously seen as actually or potentially delivered by telecom or broadcasting platforms now provided over the Internet (e.g. home banking, home shopping, voice telephony)

- Access to IT services (e-mail, World Wide Web) over mobile phone networks

- Digital broadcasters providing new services such as data broadcast and Intenet webcasting

- Internet service providers distributing audiovisual material

- Telecoms operators, in their new competitive environment, providing audiovisual services such as near-video on demand and cable television

To get a feeling of convergence, here is one example of post – convergence life:

"Your house wakes you up to a hot shower with pre – selected visual and audio information or entertainment. You create and deliver information, then go to works, either at a company or in your home office. A typical day at the office when going to the office, which is only three days a week, because the rest of the week is spent working at home. The car is equipped with route selector warnings and "news" buttons on the car's digital sound system. Once in the office, computers scan and retrieve documents, charts, and articles. Later, a videoconference connects six people and the discussion centers on a document displayed in the "shared images" space on all the participant's screens. The computer enables contact with daughters and sons directly in the school classroom as the screen comes on and the teacher comes over to respond. You

receive pictures of your in – laws on a Mexican beach – live snap shots or full – motion video. Your personal information agent selects a new best seller and downloads it for you to read later. The washing machine tells you it's completed its spin cycle. Since your house has a build – in video - conference center, you can confer with your sister about your parent's upcoming 50ᵗʰ anniversary. You read your own personal newspaper and find out the neighbourhood movie-theater has received enough request for ' Citizen Kame' and they will be downloading it for a showing at 7.00. Take-out restaurants located near home are contacted with online orders in advance."

No matter, whether one thinks in terms of technologies, information or people, convergence is tearing down barriers and therefore will also construct barriers as it streaks and ripples through society, industry, and institutions of all kinds. The potential for change as a result of the convergence can be seen at *three different levels – technology, industry, services and market.*

Technology in Convergence

Introduction

Today, convergence is most often discussed in terms of the technologies used in computers, television, and telephony. The focus is the microprocessor in the computer, the broadband delivery capability of television, and the global network, two way interconnections of telephony. Digital technologies cover a range of disciplines generally associated with the computer and telecommunication industries – digital microelectronics, software and digital transmission. Incidentally, for long time technological developments in telecommunications and computers have followed very distinct trajectories. The first sign of convergence process became apparent in late 1950's though it was not until the early 1970s that it really took off. At that time large number of powerful digital components were brought onto the market at relatively low costs. In the following years, subsequent improvements accelerated the rate of adoption of these components in all kinds of electronic equipment. (Today almost every single electronic device is based on the same digital technology.) Digitalization of telecommunications and computer equipment has broadened the existing technology base and facilitated the emergence of large-scale communication networks that carry voice, data and images. As computers were increasingly accommodated within those telecommunications networks, previously existing technological and market boundaries became vague. In the telecommunication industry, the first sign of convergence appeared through the introduction of stored program control (SPC) in the field of digital switching. The second wave of convergence took place during the mid – 1980's when analogue telephone systems were gradually transformed into fully digital networks.

Applied piece-meal within each of the relevant sectors, these technologies have already demonstrated their greater efficiency, flexibility and cost effectiveness, and have shown how they can enhance creative potential and promote innovation.

The technologies involved in convergence are all those used in the four essential functions – create, display, distribute and store – that can be applied to anything comprised of text, visuals or sound.

Computer in Convergence

Computer technology now plays a key role in content creation and production both in cinema and broadcasting worlds. The ways in which audio-visual material is produced, delivered and consumed are evolving, content has become "scalable" so that it can be used in different environments and delivered on different infrastructures. One of the building blocks, is the MPEG family of standards for digital encoding of the moving images. Once encoded in this format, images may be modified, manipulated and transmitted in the same way as any other digital information. The systems and networks handling such information are of course indifferent to the nature of the source material, be it image, sound or text. The digital source encoding thus forms the basis of technological convergence.

Digital Transmission in Convergence

Digital transmission may be carried over broadcast networks or over terrestrial wired or wireless infrastructure. When applied to broadcasting networks, the most significant impact of digitalisation is the immediate expansion of capacity, effectively removing a scarcity, which has limited growth of the sector

since its inception. But processing power and software are also helping generalise consumer devices like the set-top box. Implementing functionality in software helps overcome the product life-cycle problems associated with hardware, reducing market inertia and facilitating innovation. It also gives such devices a level of intelligence, which allows broadcasting networks to emulate the switching capabilities normally associated with telecommunications. For example, satellite pay-television operators can today address individual customers through conditional access systems, often combined with the terrestrial telecommunications network to provide a hybrid return path for interactive services.

Network Technologies in Convergence

As alternative telecommunications infrastructures become more widespread, high-speed networks based on optical fiber will soon be capable, in combination with modern server technology, of operating cost-effectively in a virtual broadcast mode. The high data rates and spectral efficiency achievable through digital transmission open up the possibility of delivering high-quality audio and video signals over a variety of different network infrastructures. Transmission technologies such as narrow-band ISDN, xDSL and ATM will ensure that both existing and new infrastructures can play a role in carrying the new services. The capabilities of existing networks are also enhanced by the compression techniques implicit in the MPEG standards, allowing networks of limited transmission capacity to carry services previously considered possible only on sophisticated and more costly wide-band infrastructures.

ATM is of considerable interest as a multimedia transport technology. It is a high-speed cell-relay technology, capable of transporting telecommunications traffic of different characteristics (voice, data, video) over the same network, and has been designated by the ITU as the basis for broadband ISDN, the successor generation of its narrow-band counterpart.

Internet for Convergence

The Internet can best be described as a network of networks interconnected on an open basis using Internet Protocol (IP), usually running over transmission links leased from telecommunications operators (TOs). It has evolved very rapidly over the past decade from a largely academic- and government-sponsored network with a backbone capacity of 56kbit/s in 1986, increased to 45 Mbit/s in 1993, and to 155Mbit/s in 1996. This huge change in the capacity of the internet's infrastructure has been in response to the remarkable growth in the number of people using the internet and the range of applications and software tools developed for it.

Internet proved to be a major exponent in the movement of technological convergence, by providing a common highway linking up people, companies, institutions and governments. At the end of year 1995, it was estimated that the number of internet users would account for a total of 33.4 million people, expected to rise to about 116 million by year 2002.

Internet affords remote access to databases and data transmission on a global scale, to services such as e-mail, distance trade, news and various multimedia applications. It has boosted a true "democratization" in these fields, going well beyond some of the traditional standards for the electronic mail.

The open, non-proprietary approach to standards for the internet has made it easy for companies to take advantage of, and build on, the advances made by others in the industry. For example, many would argue that the rapid development of the capabilities of the World Wide Web (www) has been enhanced by the open approach to browser development taken by vendors such as Netscape, Microsoft and Sun. The internet will be further enhanced as a vehicle for multimedia transport by the development of several improved or new protocols which internet service providers expect to implement within the next three years.

This brief review of the salient technological developments is not meant to be exhaustive, but to illustrate the role of technology as the motor of change. Technology is developing constantly; its application to innovative services and the bringing of those services to market promise even further dramatic change in the future. The continuing competition between different technologies can change the fortunes of one approach or another, making it difficult to be prescriptive about tomorrow's network architectures. This may be a relatively minor problem given that today's applications and services are becoming increasingly independent of the underlying infrastructure, which carries them.

Current Development in Technology for Convergence

Introduction

Significant changes are now being realised through the application of new technology to the individual sectors and these are examined in turn. Such changes are not in themselves evidence of convergence, but as suggested earlier, the commonality of technology applied could provide a basis for that convergence to develop.

Digital television and digital audio broadcasting services

In the early 1990s it became apparent that digital technology could be efficiently and cost effectively used for the delivery of television and audio signals. Of particular interest was the possibility of delivering many more channels over the same infrastructure (cable TV, satellite transponders, terrestrial spectrum) by using digital compression rather than existing analogue transmission.

In the television area, building on the work of the Digital Video Broadcasting (DVB) project and against the background of a regulatory framework provided by the Television without Frontiers Directive, the Television Standards Directive and other measures (www.itb) digital TV services was launched in Europe. Other countries around the world are also making use of DVB technology and European standards. The first commercial services started in France in April 1996. Other digital services rapidly followed and more than 200 digital TV channels are targeted at viewers in France, Germany, Spain, Italy, the Benelux and the Nordic area. Although it is early days in the development of this market a number of interesting phenomena - which are either new to TV or significant developments of past practice - are appearing as digital compression is cost-effectively reducing capacity constraints:

Broadcasting companies are marketing their digital services in the form of 'bouquets' of programme channels. The "bouquet" complements 'generalist' TV channels with thematic channels concentrating on news, sports, movies etc. offering viewers greater choice and coverage of areas of specific interest to them. Already evident in the analogue era, thematic channels are set to increase in number and to achieve ever-finer levels of segmentation with digital technology. Such channels will need to seek wider audiences for economic viability, and pan-European operation could be a way of securing them.

Technologies and industries are converging to offer more and different information through what were once divergent communication channels. In the near term, the appliance this information is viewed on in the home will not be known as a television set or a computer monitor, just a video and audio interactive display unit.

The availability of substantial transmission capacity at reasonable prices will soon make "near video-on-demand" (NVOD) services possible. Similarly, it is possible to market specific events or movie-showings on an individual subscription basis. Such pay-per-view services have been provided in the UK on analogue channels (for boxing championships) and Spain in digital format (for football league matches). The greater capacity of digital television allows the simultaneous broadcast of several such events (the most obvious case being matches played in a football league), giving viewers the choice of access to a particular event on a `pay-per-view' basis.

These phenomena, which constitute a significant departure from classic schedule-based broadcasting, have the potential to improve consumer choice. In addition, and because the "digital channel" is inherently more flexible than an analogue channel, it can deliver other services in the form of data, graphics, moving pictures or combinations of these. Digital television shares these characteristics with digital audio broadcasting, which also offers listeners near CD quality sound. "Multimedia data broadcasting" already provides for the downloading of computer programmes including video games, data files and direct access to the Internet from the TV set or network computer.

Example: Hughes Olivetti Telecom launched the DirecPC satellite Internet access service in 1996. It connects some 2000 sites across Europe to the Internet at speeds up to 20 times greater than conventional modems.

The arrival of digital radio offers exciting possibilities for the combination of radio and images, or links to internet sites marketing CDs or tickets for band being broadcast (www.it). Broadcasters such as CNN and the BBC are starting to make parts of their broadcast content available on the internet, extending their normal geographical reach, whilst a new breed of web-casters is emerging to broadcast particular live events, such as sports coverage, concerts, major events, etc.

Example: Coverage of the Irish elections was available to Irish citizens all over the world via a web-cast site (www.itv.com)

Other innovations in the broadcasting field include Wide-screen TV using 16:9 format, the technical possibility of higher definition pictures.

Telecommunications liberalisation is widening choice and lowering prices

In less than ten years, the European telecommunications sector has experienced a radical transformation from one characterised by rigid and inefficient monopoly to a sector facing full and vigorous competition. This transformation owes its beginnings in part to an earlier phase of convergence - that between telecommunications and computing - over a decade ago. Technological convergence rapidly gave rise to market convergence, and to "value-added" services - innovative services which borrowed concepts from both sectors, and which allowed businesses to extend the power of computing beyond the geographical confines of their immediate locations.

The regulatory traditions of the telecommunications sector contrasted sharply with the free-market environment in which the computing industry had developed, and their coming together meant that some rationalisation of these different regulatory philosophies would be needed if the new services were to flourish. The step-by-step process of telecommunications liberalisation and global market opening is already bringing substantial benefits to many businesses and consumers, with lower prices, improved customer service and innovative service offerings. Even so, the overall level and structure of prices continue to have a major impact on the take-up of new services.

The mobile communications business is particularly dynamic. Universal Mobile Telecommunication system (UMTS) is a third generation mobile communication system. It enables mobile phones to handle broad band applications such as graphics and video, in addition to speech and data. Increasingly, such mobile systems are adding a multimedia component. One aspect of market convergence occurring within the telecommunications sector is that between fixed and mobile telephony, as in certain Member States and amongst certain groups of the population (e.g. students, small businesses), mobile phones are replacing fixed connections.

However, this practical example of how fixed and mobile networks are converging is only part of a wider trend towards the full integration of wired and wireless technologies, which is the key goal of the next generation of digital mobile communications systems. This will offer users a platform on which to receive a seamless set of voice, data, multimedia and audio-visual services wherever they are.

The Internet is bringing new services to business and the public at large

New internet techniques, such as multicasting, offers the possibility of delivering audio and visual content to up to 50,000 users at any one time instead of 50,000 individual messages, narrowing the borderlines between previously separate sectors. Many consider that internet will become a major conduit for video and sound (especially music) distribution.

However, the internet as a platform has developed differently from traditional broadcasting and telecommunications. It has been essentially user-driven, with user-owned equipment (the routers performing central rather than peripheral network functions) and users themselves continuing to generate a substantial part of the content. The decentralised nature of internet is seen by many as the single main reason for its success, and as a lesson for the converging environment. A characteristic of the Internet, which is indicative of convergence is that it functions simultaneously as a medium for publishing and communication. Unlike

traditional media, the internet simultaneously supports a variety of communication modes, both transactional and broadcast in nature: one-to-one, one-to-many, many-to-many. An internet user may "speak" or "listen" interchangeably, interweaving public communication (the content of which is - at least in the case of broadcast content - traditionally regulated) with private communication (traditionally unregulated). This constant shift from publishing to private communication modes, each regulated through very different principles, constitutes one of the main challenges of internet regulation.

Here is the future scenario of internet:

Scenario 1 A Family Get Together:
Family watching a six foot, square wall panel with a screen split into 9 equal squares watching the New Year's celebrations around the world. This is controlled by a wireless control panel with 8 inches flat screen display and full keyboard with joystick and mouse ball built in. "The room was filled with the reflected patterns of thousands of colored beams dancing around the Eiffel Tower." The show is interrupted with a beep sound emanating from the wall-mounted speakers, for an incoming video call. "On screen", shouted Storm, in his best imitation of Captain Picard. Grandparents appear on screen and are "larger than life".

Scenario 2 Online Therapy:
A depressed loner wanders the streets and comes upon a church: "Open 24 hours, online counseling. If you need to talk, come in". Entering a small anteroom, the loner activates a monitor by pressing "start" displayed in its center and sat down facing the mounted camera. From San Francisco, the loner is in visual contact with a professional therapist (volunteer) from Stockholm, who views archived medical records.

But before internet can do the job of TV, radio and other media, we will need thousand of megabits per second to transmit HDTV – quality video to billions of home. Even now in limited areas, Cogent Communications (cogents.com) offers 100 mbps access over fiber – optics lines for $ 1000 a month. As prices decrease and fiber – optics network grows, that level of speed should become more wide – spread.

Internet Telephone Number Mapping Protocol (ENUM)
Have you ever thought of logging on to your personal computer from a phone? Or accessing any communication terminal like a phone, fax, e-mail, pager, mobile phone or web-site at home, at work or while on the move? Do you long for a world where you have just a single number rather than a long list for your home, office, fax, mobile and e-mail ID?

This seemingly utopian world of convergence is increasingly becoming a reality, thanks to an ongoing international effort anchored by the International Telecommunication Union (ITU). The key to make it happen is the final adoption of Internet Telephone Number Mapping Protocol (ENUM).

Some experts believe that ENUM has immense potential and say that it could emerge as the most important new internet platform since the World Wide Web – perhaps even eclipsing it in importance.

ENUM is the name adopted by the Internet Engineering Task Force (IETF) to describe the mechanism that used the Internet Domain Name System (DNS) to map E.164 numbers to a universal resource locator (URL). E.164 is an ITU standard that describes the format of telephone numbers used around the world.

The advent and increasing use of different communication devices, that access different networks (PSTN or IP) through different address conventions (phone number, e-mail address etc.) and input capabilities (telephone, computer, personal digital assistant) has created the need for a method that allows easy access to the growing list of devices, regardless of the platform to which they are connected or the kind of device that is used to access the information. ENUM is a solution to this problem. IT is a convergence enabler that bridges the PSTN and IP worlds (Zarabi, 2001).

Industry in Convergence

Introduction

Convergence in technology is having impact on people – to the organizations, industries, or institutions, in which they work collectively. Before elaborating the direct impact on people, it is logical to see the effect of convergence on industries. Digital convergence is already provoking a major upheaval in the industries involved in information, communications and media. The horizontal mergers among telecommunication carriers, nationally and internationally, are changing the shape of the industry. Convergence is also leading to the dissolution of traditional industry boundaries. Telephone and cable TV companies are merging or entering each other's markets. Computer manufacturers and software companies are probing new markets such as entertainment media, content, and banking/finance.

Major Players

A glance to industries, those involved in convergence will easily call us to make following inference about them – they manufacture and sell products and services used in the creation, display, distribution, and storage of anything comprised of text, visuals, or sound. These industries include the aforementioned computer, television, and telephone industries but cannot be limited to these giants of industry. Movie and television producers, data storage, radio, publishing, photography, consumer electronics, appliance manufacturers, home and commercial construction, and utilities are but a few of the industries now or in the near future that will be involved in convergence.

For above cited industries, convergence has not been a reverse "Big Bang". It's been a slow, gradual trend for many years. Each industry converges in turn, as it perceives benefits and market share from doing so. There were setbacks too. Just as the collision and blending of technologies creates unforeseen benefits and barriers, the collision of industries creates new entities and markets to serve.

Perhaps the best, or at least, most visible, example of how convergence affects industry is the head-on competition between telephone and cable TV. *CATV* has the bandwidth to carry large amounts of digitized programming, information, and data downstream to customers. Telephone has the networks to enable the highest level of interconnectivity. They have begun colliding with each other as the two industries are pulled toward digitization and digital compression. Telephony has been using digital switching for twenty years, but digital television requires transmission at a rate of four to six million bits per second and, with the development of digital compression, is just now reaching some markets. Once digital television technology is common, the collision centers around bandwidth and carrier capacity. The ensuing blend will be an industry neither telephone nor cable, and it could be computer television or computer telephone.

The entertainment industries will no longer be separated by the medium of production (film, video, music) or the channel or method of delivery. Movies are already shot on film, edited on digital video, then transferred back to film or copied to digital discs for distribution and display.

With the advances made in computerization and communications technologies, previously distinct information – based industries – such as printing and publishing, graphic design, the media, sound recording and film making, along with the carrier industries of broadcasting and telecommunications – are converging into one. Information is their common product.

Digitalization is allowing music, cinema and written word to be recorded and transformed through similar processes and without distinct material supports. Previously dissimilar industries, such as publishing and sound recording, now both produce CD–ROMs, rather than simply books and records.

What could be the reason of the convergence of above said industries? At what point of time it started? What was the pattern of convergence? The following paragraphs will explain briefly about it.

The rise in distributed computing and the digitalization of telecommunications network induced a number of telecommunication firms to accumulate skills in software and microelectronics and raised the interests

of computer manufactures in telecommunication technology. At that time a number of authors and industry practitioners argued that the information technology (IT) industry would eventually offer a continuum of products, which could not be referred to as either telecommunication or computer products. They envisioned that all the different IT markets would melt into one giant information and entertainment industry and that firms would react to new opportunities by lateral entry into each other's market.

Before the first sign of convergence, the relatively stable environment that characterized the computer industry and more in particular the telecommunications industry for such a long period, induced firms to develop a stable set of routines to deal with the business environment. Today such routinized behaviour does not seem sufficient to deal with the technological convergence process in the information technologies. The required technological competencies in adjacent technologies are not often present within the existing technological base. For companies lacking such competencies, several options are open to acquire the essential technological knowledge. Technology can be developed inhouse or it can be acquired on the market by armlength transactions (e.g. using R&D contracts) or through the acquisition of technologically sophisticated companies. Between these two extremes, acquisition or internal development, several options are open to the company. Companies may perform R&D together with a partner, license – in technology or use other forms of cooperation. Internal development is costly but often necessary to achieve the required technological base. Cooperative strategies, on the other hand, involve less capital and are particularly suited to monitor new technological developments. In the past decade the number of strategic alliances made by firms has increased substantially, in particular in high-tech industries. The alliances, however, often appears only effective in combination with internal development.

For example, in 1984 AT&T were allowed to enter other (unregulated) market and it acquired companies such as MOS Technology and NCR. IBM on the other hand grasped the opportunity to strengthen its presence in the telecommunications market and brought telecom equipment makers Rolm corporation and SBS satellite. AT & T turns it focus on the computer industry by acquiring a stake in Olivetti. Although acquisition of knowledgeable companies seems to be an attractive options for companies that have to deal with convergent technologies. Acquisition strategies are hampered by at least three main problems. The first problem is associated with information distortion and opportunism, which may misled the acquiring companies. A second problem is that creative and innovative companies, which are incorporated in large and bureaucratic structures, often lose their flexibility and therefore lose much of their original creativity and innovations. Third problem is related to the externalities, which are connected to the acquisitions of a company. It is often difficult to divest those assets, which were not sought for in the first place. An additional problem that is associated with acquisitions occurs if a company does not have an already sufficiently developed level of technological knowledge in a specific field. It is often noted that a firm's absorptive capability is to a large degree dependent on the degree of knowledge into its specific field. It can be concluded that if the core of a company's technology base is not sufficiently adapted to the new technology, then the absorption of acquired technological knowledge within the technological core of a company is very difficult.

These factors may explain why most of the acquisitions were not very successful. In the late 1980's IBM moved out of the telecommunications by selling its share to Rolm. AT&T's attempt to "converge" with the computer industry via its acquisition of NCR lost billions of dollars, and the changing nature of equipment markets forced it to divest itself of equipment manufacturer Lucent. US West's foray into cable TV alliances was also less than a resounding success. Obviously, the economic and technological forces reshaping the industry are not simple. There is a need for forward-looking analysis of what is driving current trends in industrial organization derived from theoretical models of the macro-level economic and technological forces.

Small Enterprises

The picture drawn so far has focused largely on the technology and the major players in the convergence process. But convergence has another face. Just as technology has given large media and communications firms a global reach, it has also encouraged the proliferation of small players: individuals, teams, small and medium sized enterprises able to create high quality multi – media products, such as CD – ROMs, or to provide niche services, such as building Web sites or developing on-line advertisement campaigns. A plethora of small electronic publishing and multi-media service companies in Europe and the United

States generate much of the content, as well as much of the employment, of this emerging industry. Many of these might qualify as micro enterprises, composed of two to ten employees. While some specialize in providing such products and services directly to local clients, many others work through subcontracting arrangements, which channel their products further upstream.

Electronic mediation has made possible the growth of "virtual" enterprises, in which employees basically work alone, distant from each other, but connected by a modem and a telephone line. An editorial production firm, for example, can easily employ its writers, editors and art directors at different locations, as long as their computers can communicate to exchange and combine their work. In such virtual firms, employers and individual workers may not even know each other, except through their email messages and quality of their output. Freelancers – many of whom may be tele-workers – form a large portion of the work force, in effect becoming "virtual employees". When such enterprises combine the work of employees based in more than one country, these distant workers may find themselves without the normal protection offered by their national legislation.

The Institutions
Institutions also ride convergence into their future. Libraries, hospitals, schools, universities, government of all levels, police and fire – each connects with others and they people they serve. They converge because of the available technologies, the industries that provide them, and the need for what the institutions offer. For many institutions, the convergence is one of the ideas. If a consumer can access medical information from any or all, the information has converged, and in the process the institutions themselves, or at least some of their functions have converged. Professors, doctors and teachers used to communicate daily with a peer in the next office or down the hall. Now they can consult across the oceans. Information and ideas flow easily in two directions at comfortable speeds. Ideas converge and clash, converge and blend. Service spreads beyond the bounds of time and space. When real time interactivity moves out of the research centers, education will converge on the learner, not the other way around.

Human Factor in Convergence

Introduction
The implications of convergence in knowledge-based industries, is not limited to above described phenomena, rather the effects of technological convergence are visible from emerging new trends in market and the phenomenal effect on all of us. It has also put questions about regulation of services based on technological convergence. The emergence of new technology with each scientific breakthrough – making the in-use technology, obsolete very fast, necessitating to develop an effective mechanism for regulation in such cases. The information technology is forcing more and more countries to open up to international competition and to enter the so-called information age. It is a key component of a one-world economy. But what are the real implications for governments, employers and workers and their organizations when information becomes the worlds' principal economic resource and when the economy restructures itself accordingly? How can we prepare ourselves for the changes ahead and how will we redefine ourselves as economic and social actors? The evidence suggests that nations, enterprises and individual workers who are able to acquire, transform and use information productively and imaginatively will benefit from the technological advances now set in motion. And above all, it has put a challenge before society – the people in its own way. The following paragraphs will cover the challenge imposed by technological convergence on people and society.

Employment
By some estimates, knowledge workers account for eight out of ten of all new jobs in the advanced economies. Almost undoubtedly, many of these workers will find deep satisfaction when their new job calls forth their creative potential. But, what about the others? What about the economies which are left behind? And what about those members of society and of the workforce who are slow to respond to the new demands - the ones whose skills are rendered obsolete by technological advance, those who do not have the education and training to reap the benefits that the information economy will bring? Even if up to 80 per cent of new jobs are knowledge-related, this does not yet automatically mean that all of them are challenging, well-remunerated and satisfying.

For some occupational groups, particularly those engaged in providing creative content, the multimedia revolution promises tremendous growth in opportunities for work as distribution channels multiply. In 1995, the production of films and audiovisual products employed more than 850,000 people in Europe, compared to only 630,000 a decade before. At least one observer believes that by the year 2010, films, multimedia and television will be the single largest employer in Europe (www.ilo). Musicians are the notable exception to this optimistic forecast for creative content providers. Technological developments, such as the synthesizer, have been remarkable in the degree to which they have eliminated the opportunities for paid employment.

For other workers, particularly those in craft occupations tied to particular technologies, the challenge will be to acquire new skills and adapt to new modes of working in a context of diminishing opportunity in their former specialties. Examples abound of the labour-shedding tendency of advanced technology. One might mention the miniaturization of camera equipment, which rendered obsolete the cumbersome mobile TV units of the past, staffed by camera operators, sound specialists and support personnel, replaced them with a single reporter carrying a lightweight camcorder. In the motion picture industry, computer-generated "synthetic reality" now provides an alternative to the construction of expensive film sets, threatening the livelihood of the carpenters, decorators and electricians who build and light them. Digital video sampling allows the creation of dozens of "synthetic characters" from the images of a few. The crowd of 50,000 demonstrators in *Forrest Gump*, for example, was generated from the images of fewer than 1,000 extras (www.ilo).

If as some claim, the digital economy is "a massive job-creation engine", it might be added that opportunity will favour the well-educated, multi-talented job seeker, whose skills portfolio is constantly expanding. Amid large-scale loss or downgrading of employment for those with lesser qualifications, burgeoning opportunity is foreseen for those with the skills mix needed to work creatively in an information-intensive networked environment. Yet most workers, even highly qualified professionals, may expect unstable, impermanent employment, with multiple job changes in the course of their careers. And many workers will find themselves employed on a contingent basis, working part time, temporarily or for more than one employer at a time.

Many future jobs will be based on technology, which is today in its infancy; these jobs will call for undreamed of skills. The speed with which the software houses of Silicon Valley responded to the special effects desires of Hollywood producers gave birth to a flourishing computer-generated visual effects industry within the space of a few years.

Though technology will continue to leap ahead in digital bounds, human skills acquisition will likely progress incrementally "in an analog mode", building on a base of previously acquired skills. When computer colour separation was introduced, for example, the preliminary processes of colour printing were transformed, but the expert eye and technical knowledge of photolithographers who had undergone retraining were much in demand to ensure quality control of the final product. Many trained typographers made the transition from Linotype to computer composition, applying the aesthetic judgement of their former craft to a new mode of work.

At the same time, technology has erased or reduced the entrance barriers to much technical work by becoming more user-friendly. The gradual emergence of industry standards among information technology producers makes skills more easily transferable from one domain or type of equipment to another, enabling more crossover among technical and non-technical staff. Page make-up has become a white-collar job and those entering the field may never have had formal training in the print industry. Indeed, many of those entering the field will find employment in non-printing firms for which the processing and distribution of information is important.

Web technology makes it possible for many different kinds of projects to be structured as studio type work. A project owner who wants to assemble a team can go online, describe the project, and find out who is available. People and organization with the right skills can declare their interest, and the project owner can assemble a team more quickly (Gates, 1999). People looking for work will find more opportunity for

employment that meets their particular interests and requirement - if they have highly specialized skills, for example, or if they want to work only for certain hours.

The Web life style is not about changing human nature or the fundamentals of how people live. Instead the web lifestyle give more people a chance to pursue their interest in a better way. It also makes easier for people who have good skill set and who can't or choose not to work full time. Because they can find more work over the internet and do more work remotely, such people will have new opportunities, and society will benefit by better utilizing this huge pool of talent. Many knowledge workers will live where they want to live and structure their work the way they want it and still make major contributions to the businesses they work for or with.

Education and Training
Where will the new skills come from? How can firms be assured of finding the skills they seek? How can workers be sure that the skills they acquire will actually prepare them for the job market? There is much room for concerted efforts on the part of governments, employers and workers to minimize the mismatch between available skills and those in demand and to prepare the workforce for the changes ahead.

High-quality basic education is the broad foundation upon which all new skills will be built in the information economy. Such education goes beyond high levels of literacy and numeracy; it should instill a love of learning and the capacity to adapt to change. Many countries are actively engaged in getting computers - and especially computer skills - into classrooms in order to familiarize children with the rudiments of interacting with electronically mediated information.

But basic education only goes so far. Higher levels of general education and the acquisition of specialized skills, including a large dose of computer skills, will increasingly be the norm among entrants into the multimedia job market. While many job-specific skills are acquired in the workplace, either through employer-provided training schemes or informally through the sharing of knowledge among colleagues, employers will increasingly expect applicants to come to the job with a skills portfolio which is already well stocked.

Will training programmes, as they are currently designed, meet the needs of these employers and potential employees? Will they adapt quickly enough to rapidly changing needs? Or will they lag behind, braking the smooth transition from school to work by preparing young people for the jobs of yesterday rather than for those of tomorrow? This is an area which could potentially benefit from tripartite cooperation.

Large-scale employers are the best equipped to set up training programmes to meet the specific needs of their enterprises. Jointly sponsored training schemes, along with apprenticeship systems, have also proven their worth in the past. But the information economy poses two great challenges to enterprise-based training. First, the employment structures of many firms in these converging industries rely on a diminishing core of permanent, or at least long-term, employees and on a growing portion of contingent workers employed part time, temporarily or on a project-by-project basis. Because of their part-time status and especially in the instance of short-term engagement, these employees would rarely, if ever, benefit from employer-provided training packages, which are largely directed to permanent staff.

Second, small and medium-sized enterprises account for the most dynamic employment growth in the information sector. Many operate with just a handful of employees; few are able to offer training themselves or to release staff from ongoing work. These employers depend almost entirely on the skills that their employees have acquired before being hired, whether through formal education, previous work experience or at their individual initiative.

Many observers thus expect that in the future much of the burden and expense of training may ultimately fall on the shoulders of individual workers, whether in terms of initial preparation, ongoing education and training, or adapting to new professional orientations.

Labour Relation

The transition to the information age is unlikely to be a smooth one. Just as in an earlier time, the industrial revolution disrupted the lives of millions, forcing rural workers to shed their agrarian habits and adapt to mechanical processes, so the information age will shake the foundations of our current economic structures, shatter dearly held assumptions and give rise to a new set of expectations. The chaotic nature of the change in progress, its accelerating pace and the difficulty of foreseeing outcomes exacerbate fears that the global information society will be polarized, fragmented, or even "atomized". Some fear a future in which individuals will be forced to struggle for survival in an electronic jungle. And the survival mechanisms which have been developed in recent decades, such as relatively stable employment relations, collective agreements, employee representation, employer-provided job training, and jointly funded social security schemes, may be sorely tested in a world where work crosses borders at the speed of light.

Social dialogue and tripartite participation in the search for socially acceptable solutions are the principal guarantors of a smooth transition to an information economy. Yet developing the practical mechanisms for social dialogue in this emerging multimedia industry will prove a challenge, for the convergence process highlights a certain structural mismatch of economic forces, political frameworks and social institutions. The rapidity of change, the extent of industrial restructuring and the degree to which work is being transformed will test current institutional mechanisms for workers' representation.

Privatization and the restructuring of telecommunications firms provide an example of the types of challenges being faced. High levels of retrenchment in well-established, traditional service providers have been observed and the increasing recourse to outsourcing has also reduced the level of direct employment. British Telecom cut 70,000 jobs between 1990 and 1992; AT&T announced the elimination of 40,000 staff positions; Japan's NTT is planning to cut nearly 50,000 jobs through early retirement and voluntary redundancy; and Deutsche Telekom may face the loss of 60,000 posts. Although overall employment in telecom-related work is expected to expand owing to the demand for new types of communications services, much of the new employment will concern contingent workers and arise in non-unionized firms or in non-telecom workplaces (www.ilo). How can the interests of these workers best be represented?

A multimedia industry structure is emerging based on major conglomerates and myriad small enterprises. It is often the small firms which create the "content" sold upstream through intermediaries to the major players. Because of the small size of these companies and the varied skill composition of their workforces, terms and conditions of employment are often negotiated on an individual basis. Traditional bread-and-butter issues appear to be of less importance to these white-collar workers than their opportunities for job enrichment and professional development. Unionization rates are low and the institutional mechanisms for social dialogue are often lacking. Again, how can the interests of these workers best be represented?

Those who work in these converging industries have much to learn from each other and to convey to other occupational groups entering the information economy. In industries such as telecommunications, for example, where the workforce has been employed for the most part on a full-time, quasi-permanent basis, tremendous uncertainty has been engendered as contingent work patterns have emerged. Yet the protection of contingent workers has long been the principal activity of actors' unions, for example, and this is an occupation where unionization rates often remain exceptionally high.

Until recently the complex labour relations structures of the entertainment and mass media industries have made it difficult for workers' organizations to communicate across industries, occupational groups and jurisdictional lines. Because their past experience has been so varied, some have operated in relative isolation from each other, although evidence suggests that the convergence process has encouraged wider-based cross-sectoral dialogue. Workers in telecommunications and cable companies, for example, have recognized a commonality of interests. Workers in the converging multimedia industry should enjoy the same rights, in terms of freedom of association and collective bargaining, as other workers, in line with ILO principles.

National systems of social and labour protection may also need to be adapted to meet the needs of tomorrow's workforce. It is important to develop the legal and contractual framework (labour law, collective agreements, industrial relations) which will allow firms and individuals sufficient flexibility, while providing adequate security to workers. Two fast-growing employment groups may need special consideration: part-time workers and teleworkers.

The Home Work Convention, 1996 (No. 177), and its accompanying Recommendation (No. 184), have as their objective to encourage the promotion of equality of treatment between homeworkers and other workers, particularly with regard to freedom of association, protection against discrimination, occupational safety and health, remuneration, statutory social security, access to training, minimum age and maternity protection. Those who work on-line from home or in other premises of their choosing may be covered by their provisions, unless such staff are legally considered to be independent workers under national laws, regulations or court decisions.

One of major tasks in the ILO is to map out the roles and responsibilities of governments and of employers' and workers' organizations in regard to this change. This calls for a comprehensive review of the kind of society we are facing.

Regulations

In 1997, the European Commission issued a "Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation." But Europe has still not been able to reconcile disparate regulatory regimes in different countries and formulate a uniform policy due to disagreements among key players (Prasad, 2001).

British Telecom contended before the European Commission: "Contrary to convergence, there are four distinct markets - content creation, services management, delivery networks and customer equipment." BT wanted separate pan-European regulators for each of these four sectors, and warned: "Each of the four sectors has its own barriers. As services are still evolving, early regulation could hit the wrong target as well as delay development."

The European Public Telecommunications Network Operators' Association (ETNO) had a different view: "Dismantle sector-specific regulation, adopt a single technology-neutral regulatory approach for all converged services, and give administrative responsibility to a single authority." In India, Nariman's committee is broadly in consonance with this view.

The European Service Providers Interest Group (SPIG) disagreed with ETNO: "Designing a single regime to cover very different market structures would in practice cause substantial over-regulation. We support the retention of existing separate regulatory regimes. Deal with convergence on a case-by-case basis."

Even the most deregulated country in Europe, the United Kingdom, has 25 regulatory agencies covering various "convergence" sectors, an extreme instance of SPIG's approach. UK cable companies need to obtain licenses from both Independent Television Commission and Office of the Telecommunications Regulator (Oftel). Depending on the specific services they intend to provide, many satellite television operators also need to obtain licenses from both. ITC and Oftel had fierce battles over digital terrestrial television services. A compromise was worked out whereby ITC would be the principal regulator over content but access systems would be under Oftel's control. UK's multiple regulators are still squabbling over video-on-demand services provided over telecom networks, near-video-on-demand services provided over broadcasting networks, and their contents. Nor can they agree on who will control web TV.

Even United States and Canada, which from the outset have had a single regulator for telecommunications, radio and television, are facing problems in dealing with convergence. Larry Strickling of USA's Federal Communications Commission admitted: "The key challenge in front of us is to understand the converging nature of different industries. We have to develop regulatory systems which will allow that convergence to thrive instead of getting bogged down."

Françoise Bertrand, Chairperson, Canadian Radio-Television and Telecommunications Commission, conceded: Direct-to-home satellites, wireless technologies, multipoint distribution systems and local multipoint communications systems have substantially changed our traditional ideas about service delivery and the packaging of services. The Commission's prime responsibility is to adapt to this new environment, to evolve a system for industries to regulate or exempt from regulation. CRTC has to develop new principles to deal with access to facilities by new entrants, facilities-based competition, and resale of bandwidth and access services.

Nariman was well aware of these pitfalls when he stated: "The real issue facing us is not how technological convergence should be regulated, but rather, how the nature of regulation itself has to change in light of convergence of technologies. The impact of the Convergence Bill on the nature of future regulation in India may turn out to be much greater than the influence of the present regulatory system on the Convergence Bill."

Antipathy

Some say that the focus on this technology is said to be on the dehumanizing business (Block, 2001). All this technology is desensitizing us and leading towards some kind of virtual existence. To be human is to have senses, to touch, smell and feel and how the digital world is leading us towards more humane, is difficult to comprehend. The issue is not hating technology, but not to get down on our knees and worship technology, per say and saying that technology would solve all the problems? Technology is just a tool, but that is it. We are increasingly using technology as drugs. Just to have the right balance seems to be the only logical solution.

Further, as the pace of the technological change accelerates, workers are expected to learn more and more new IT applications. Unlike managers and IT specialist, their reactions to new technology vary greatly; although in some cases they are enthusiastic, in others, poor communication, organisational power shifts and a host of other factors can lead to hostility or apathy. Increased use of technology might also result in uneven distribution of work as well (The Human Factor, 2001).

Conclusion

The present day advancement in information technology is leading to a point where various technologies are converging. This convergence of technologies has opened new opportunities in business and infinite possibilities for growth. Many information-based industries are looking for new alliances to strengthen their presence in changing market conditions. Small and medium sized enterprises are playing a major role in providing new employment to influence the world economy, which is increasingly based on creation and manipulation of information. It has benefited the humanity in many ways. However, sociologists wonder what affect convergence and its by products will have on society. Convergence is chaotic so far, and has released new methods of communications. It has revolutionized the concepts of business and today information is the major source driving the world economy. How we gather, manage and use information will determine whether we win or loose. Some will see doorways open for them to enter in new era of technological convergence, but for many who can not afford to take advantages of all convergence has offered, those door ways will not appear. Convergence will go unnoticed by those who are unable or unwilling to transform their ignorance or misfortune into knowledge and opportunity. However, technological convergence has put many questions in regard to regulations, employment, training and education, which need careful attention of governing bodies.

The human being, ultimately for whom all this technology is meant for, must not be neglected for sake of advancements. The basic aim or objective in all these advancements needs to be aimed at easing the burden, in what so ever way it is. Not the other way, where the life is more complicated, arduous and devoid of feeling or touch. Instead of treating convergence as drugs, we need to use it as just a tool. With each advancement, the past tool, need to be treated as a part of the new processes, rather than altogether discarding it, thereby the making the industry, people associated with it, the market attached to it, redundant. Just to have the right balance is the right approach.

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