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By

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INFORMATION, TECHNOLOGY AND SOCIETY*

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When social scientists and the general public used 'information' not so long ago in the past, their concept was information as communications content. The information technology they were concerned about was the threatening implications to society, of such products of technology as television, watchman, or the communications satellite. Information technology in its current meaning, was seldom touched. That was during the World Communications Year 1983, about a decade after Wilbur Schramm – in his keynote speech to the first Amic conference – noted briefly on the exciting progress of microelectronic technology, and raised questions of what all that would mean to development communication.

Indeed, until recently, information technology¹ has not received the attention it deserves in the analyses of societies. The tendency is to view information technology (IT) similar to all other technology in general, mainly as the restricted domain of the natural, biophysical or technical sciences, quite apart from the studies of people and their behavior.

This narrow view is still being held even today by some in the social as well as the technical fields (the technologists), cultivating contradictory but widely held beliefs and prejudices among the public at large. On the one hand, there is the belief concerning the deterministic nature of technology. In this view, technology is inevitable and inescapable. Technology progresses linearly and steadily ahead like a train with no stopping; it has to be accepted and joined by anybody or any society wishing to advance. In this view, technology is supposed to be value free and neutral; any failure to adapt is blamed to backwardness, cultural or educational lag, not to the technology itself. This view is so dominant among technologists, that it is called the 'ideology of technology' by Pacey (1983) in his book *The Culture of Technology*.

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¹Please note that information technology and communication technology are used throughout this paper interchangeably. The convergence of both technologies are such that it is difficult to distinguish the respective product application of either one from the other. Any product of communication technology today cannot operate without the use of at least some elements of the information technology esp. the chip. Likewise, information technology products are becoming more interdependent to other technology that they need to be linked by communication technology.

Such ideology, on the other hand, creates a counter-ideology, the resistance and prejudices against technology—as much as against the technologists. In this opposing view, technology is detrimental in its nature. It tends to bring about as many, if not more, problems and negative side effects rather than benefit, for people, society and the environment. The resistance and prejudices seems to be particularly strong toward information technology and informatics, so much so that the society of IT technologists are called as the 'cult of technology', who "confuses what computers can do well with what they cannot do at all". (Roszak, 1986).

The two kinds of opposing beliefs and attitudes are still alive in public reactions and responses toward the application of new communication and information technology. Almost any new product of information technology, especially consumers product (home computers, television, dish antenna, multimedia, etc.) are accepted quickly by the market once it is introduced, seemingly without giving much consideration to the real use, operations or potential problems. At the same time, critical public reaction continue to be raised on information and communication technology. A community may have use the *parabola* dish antenna for years to watch global entertainment, but they keep blaming television technology for disseminating undue alien values which, in fact, they can stop anytime with the push of a button.

Apparently, information and IT is placed in a very limited context by the general public, i.e., in terms of isolated aspects or effects. The impression is, it merely brings impact, but it is detached from the society, not liable to the influences of the social environment nor accountable to the society at large. Similarly, society is considered only as an object for technology. This reflects how society is lagging behind in the understanding the social meaning of the technology that they already adapted. If this line of thought continues to be held, ultimately society would become determined by technology for real – fully indoctrinated with its ideology of technology.

The Role of Information

On closer examination, however, technology should not become that powerful. After all, in line with J. K. Galbraith's definition, technology is the systematic application of scientific or other organized knowledge to practical tasks of human beings and their societies. Technology is needed to accomplish such tasks and ease human efforts to achieve the goals according to the values of their society. It is developed in order to fulfill the needs, implement the wishes, or form a better society according to their ideals. Therefore, the general meaning of technology includes cultural and organizational aspects, says Pacey, and not only the technical aspects. To illustrate in the context of IT, try to imagine the information superhighway without telecommunications institutions and their complex interrelationships, societal rules and values on the allocation of natural resources such as radio frequencies and satellite parking space, or for that matter, the values that motivate people to communicate and seek for information from faraway locations. Technology, therefore, is an integral part of the larger system of societies as a whole.

As such, the trends of technology follows the main directions set by the society, that is, by the dominant segments of the society – whether in the small regional society of local population or in the larger society of nations. In other words, technology does not determine by itself what alternatives human society should take in the

application of technology. It is those who control technology, i.e. the technologically powerful nations, that determines the direction to choose for the global societies of nations. Although theoretically, a small society may still opt differently in its technology decision, it would not be able to retain its decision for long. (How could you defend a B&W television broadcasting system when all the equipment manufacturers switch to HDTV when and if the new standards is set by the FCC?)

Obviously, technology is not deterministic, but societal power is. Even so, once the decision is made, further direction of technology will be determined by a combination of factors – including the social dynamics of technological adaptation. Here, one factor which is often thought as technological determinism is that of the society of technologists, which pursue directions that conform to their own cultural values (e.g. to strive beyond the limits), and then persuade the larger society to adapt. There are many cases when society refuses to adapt a new technology, but when they do the perception is created that technology is inevitable.

The dynamics of technological adaptation is probably similar to the social dynamics which come to play in other innovation process. Once it takes place, however, the innovation may become a new factor of influence working toward changing the society. This may be especially true in the case of information technology.

Information and communication are important elements in the formation of societies: they determine the characteristics of societies. Societies can only be formed when information networks are established, and basic agreement and rules are set on the what, the who, and the how of communications. Informal social structures and formal institutional structures are basically communication and information networks, managing the processing of information and its flow.

The importance of information and its technology to society is even more obvious, when we examine how they support the various elements of a society. Society, according to sociologists (Goodman, 1992), is a collection of people who share a common culture (which they transmit to succeeding generations), a common territory, and a common identity, and who interact in socially structured relationships. The common culture provides a shared "design for living", common geographic territory provide a shared space in which to carry out such design, and both provide a shared sense of identity, a sense of communality. All these could only be developed by human interaction, in other words by communication and the exchange of information. When members are dispersed in a shared space so wide as a country such as Indonesia, information and communication technology are essential infrastructure to overcome space and time constraints, and maintain national integration.

The channels of interaction are the structural elements or building blocks, of society. Social structure is the recurrent pattern of relationships among the elements of society, i.e. status, role, groups, organizations, social institutions, and community – all of which are based on the management of information. Status, for example, may be accorded on the basis of social perception which is developed or built through media exposure. Organizations, social institutions, and community in today's society require interconnections through telecommunication infrastructure and adequate information storage and processing, thus supported by IT.

Although the choice of technology is determined by society, technology itself also influences society in many ways once it is applied. The design of telecommunication networks, for instance, would affect the allocation of power within the society. Due to its role as an infrastructure, IT actually influences – and even could determine – the way power is shared by the suprastructure. Those who are not linked to the network of infrastructure would be hard put to acquire the latest information of constantly and may be left behind by the changing environment. Businessmen would be left behind if they cannot get connected with the financial network and information data bases.

The increasing and extensive use of technology to manage increasingly complex society, therefore, may bring negative potentials for the wellbeing of the society – far beyond the micro social impact that have been discussed for so many years. If technology is accepted as they come, and the infrastructures is randomly laid down or designed on the criteria of financial ability to pay for the line, it may restructure social power in an intentional way. The potential dangers are various, both positive as well as negative. The design of telecommunication lines may both result in closing socio-economic gap, or the reserve, increasing socio-economic imbalance. Interconnectivity with the networks of societies with incompatible values, may furthermore, endanger the basic foundations of the original society which apply the technology in the first place.

Information Society

The need to view information, technology and society in an integrated, holistic, approach is increasingly felt today, when societies are making preparations to enter the 21st Century, which will bring drastic transformation of the global society – no matter whether we name it the Information Society or the Era of Free Trade. A cursory examination of the concepts would show how society would use IT and how IT would affect social transformation.

The advent of the Information Society brings forth new and broader concepts on the role of information and its technology in society. Fritz Machlup (1962) probably started this conceptual development when his study almost three decades ago concluded that the economic structure of industrial societies was changing. With a rapid growth of information services and knowledge production, a new 'information sector' was expected to outgrow the industrial and agricultural sectors, giving birth to an information economy. Since then, others have analysed the phenomenon from the viewpoints of technology, social and cultural developments and propose expanding the important role of information even further. Marc Porat, for example, stresses on the crucial role of communication and information technology in the development of the new information economy.

The importance of information is continually growing not only in terms of the economy but also in the context of the whole society at large. Since information is a highly valued commodity in an information society, Daniel Bell (1973) foresee that information will have an impact on the social structure as well. Those who produce new information (scientists, R&D workers, engineers) will be treated as super elites in an emerging new class structure. Information is also considered by Bell (1979) as a

strategic resource for the transformation of a society in all aspects, including political. The view of information as a political and economic resource is advanced from a different perspective by Alvin Toffler (1990), who proposes a concept of information which essentially replaces the position of capital in a society. Information is the basis of power in the coming society, just like land in the agricultural society, or money and capital goods in the industrial society. The power of information therefore may not be vested in information producers but rather in the ownership or application of information resource.

As a factor in social change, the importance of information has been noticed for some time by policymakers and development planners. UNESCO has been using the media index to measure social and cultural development of all UN member countries. Another UN agency, the UNDP, regularly compares economic development in various ways, among others in terms of information. Its Human Development Index includes literacy and schooling, which indicate basic information capability of an individual. In its measurement of South-North gaps, the agency includes adult literacy, years of schooling and telephones. To compare developing countries, it looks among others to their communication profiles, using such indices as radios, televisions, cinema attendances, daily newspapers, books, telephones, and letter posted. For the industrial countries, UNDP also compares registered library users, museum attendances and international telephone calls.

The Information Society is today fast becoming a reality and much of the theoretical discourse concerning its implications are beginning to be observable. The information sector is growing, even extending beyond industrialized societies to some developing nations. Workers in information related services and graduates with information skills obtain better positions and pay; they are much in demand as communication and information infrastructures are expanding faster than manpower. The emergence of Daniel Bell's super elite may be debatable; while the innovators of the new technology and producers of information do occupy high economic status, they have not been considered as a separate socio-economic class. Similarly, information has not replaced land and capital as predicted by Toffler.

Yet, land or properties, products, services, or capital goods, will raise in value when it has more information content or component. Information and information technology have a high added value compared to manual skill, as can be seen in the case of the fly-by-wire aircraft, intelligent house, smart bombs, electronic equipment capable of more functions, etc.. Information similarly add value to people to groups by classifying them according to address, settlement, properties, and hence, create social differentiation.

Information therefore play a role in the creation, and subsequently widening the gaps between socio-economic groups in a society. One source of the disparity between the high and low strata is information inequality. The groups which occupy higher socio-economic status have more access to education, communication channels and information sources. They are much better educated, possess the information necessary to gain to the higher position, and have more information available concerning new opportunities. Consequently, they are more knowledgeable on the ways to improve life, minimally retain their status, or even enhance it further.

Virtual Society?

Wider changes may yet still to come. The excitement and enthusiasm to get plugged to the information highway, for instance, has propelled a part of our own societies (a small segment to be sure but the most influential segment nonetheless) to live in two societies at the same time: the real society of each of our own country and the virtual society. To live simultaneously in both the real, physical space and the cyberspace. We may not know or be able to evaluate which is real and which is virtual.

Add to this the complication are the semi actual communities we meet in the virtual society. Trade liberalisation being brought by the Marakesh agreement, make it possible to use the cyberspace to develop real relationships with the global members of our professions or trade, with real resources, clients and real customers.

Clearly, things need to be sort out. We have to develop the capabilities to manage our world of information, which is no longer limited to the pictures that we can store in our heads. Our information space is expanding wildly, doubling as fast as the doubling rate of the capacity and clock speed of computer chips. Thanks to the rapid increase of IT capabilities, the quantity of information which have to be dealing, is also rapidly expanding at an exponentially accelerating rate.

Howard Frederick (1993) describes how the total amount of information and knowledge grows in the past years since the invention of new IT. Taking all the information available in the year 1 C.E. as one unit, it took 1,500 years for the amount of information to double in size by the dawn of the scientific revolution. But afterwards, the doubling time keep decreasing, from every 250 years, to 50 years, and since the 1950s, to 10 years, six years, and currently estimated to range between eighteen months to five years. Between the time a student enters and graduate from the university, he says, the core knowledge doubles in size.

If we are not careful in managing information and applying the rampant technological growth, pretty soon we will be bitten by the bugs of what Wurman (1989) aptly calls 'information anxiety', the disease of the information society. The rapid expansion of global interconnectedness through the Internet this year alone, even before the information superhighways are completed, shows how information 'tsunamis' could overwhelmed the society. Those who have log in to this network of networks and inquire about Indonesia, for example, have been flooded by all sorts of unsolicited information which are far from reality.

The superhighway and the global trade is transforming the information society even before it could find it forms. A flood of questions and problems, no longer limited to specific media impact of social mores, are demanding answers from both information technologists and social communication specialists. If future society is the Information Society, what are the main institutions? What kinds of role ought to be played by information resource and infrastructure managers, in order to prevent further imbalance in the society? How can development uplift the poor with information, when the information and technology available for them would not have

real operational values, relevant to provide them with the capability to find, select, and use information to increase their welfare in increasingly competitive world?

Add to this are questions of the kinds of society we must be working for, in each of our own countries. The sociological criteria of society is no longer adequate. The society may no longer be limited to territory, when territory and space is no longer real and physical, but can be virtual. How do we share the common environment of cyberspace, and what would be the shared common identity, and shared culture? All these will make future society unimaginable, when the real members of the society in our countries are still living in all three of Toffler waves of civilization, with all kinds of society types, real as well as virtual.

Nevertheless, all the technological possibilities should not detached us from the real world. As human beings, each of us still needs a real, physical place; real, physical environment, neighbours etc. Communication, social as well as technological must still account for this real sharing to be worked out. •••