SUSTAINABILITY, KNOWLEDGE MANAGEMENT AND THE INTERNET

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Summary

The thesis is developed that the key to human survivability and sustainability lies in our ability to make use of knowledge tools primarily the latest electronic ones, namely, computers and the Internet. We show that computing and the Internet are part of a evolutionary chain of languages which also includes speech, writing, math, and science, where language is defines as communications plus informatics. The relationship between media, technology and social class are described to set the background for how resources can be redistributed in an equitable manner to insure the sustainability of the human race. The practical role that computers and the Internet can play in realizing these laudable goals is then described.

1. Introduction

We live in the best of times. We live in the most dangerous of times. Never before in the history of humankind have we enjoyed greater prosperity and at the same time never has the threat to human survival been greater due to environmental degradation, over population and the possibility of nuclear war. The explanation of this paradox of increasing prosperity and increasing danger lies in understanding that our knowledge tools create both service and disservice. While they are the means by which we created the great wealth and well being that we enjoy, their misuse endangers human survival. While the threats to human sustainability are physical agents such as pollution, disease or nuclear weapons the real problem we face is human behavior, greed and the lack of co-ordination in the use of our resources. Garrett Harding (1968) formulated the problem in terms of the Tragedy of the Common where each individual tries to maximize his or her own advantage from a common resource without concern for its preservation until due to a lack of coordination that resource is depleted and eventually

destroyed. The "common" that Harding used in his parable was the community pasturage of a village. The "common" whose tragedy we must advert is the biosphere upon which human survival and that of all other life forms on this planet depend.

The solution to the dilemma we face is the co-ordination of the use of our knowledge tools especially those of computing and telecommunications. The social institutions that currently guide our creation and distribution of wealth are products of the Neolithic and Industrial revolutions. They are hopelessly out of date and mismatched to the challenges we face today. I do not wish to add to the hype surrounding the information highway but I believe that the Internet points us in the right direction for world co-operation. The Net, which is a marriage of computing and telecommunications, is a social metaphor which can be used to co-ordinate and mobilize our resources on a global level to insure the survival of the human race.

2. Language = Communications + Informatics

The analysis presented here is based on a thesis that I have developed in *The Sixth Language: Learning a Living in the Internet Age* (Logan 2000). At the core of my approach is the notion that language is more than just a system of communications, as traditional linguists claim. I believe that verbal language has both a communications and an informatics dimension that facilitates human thought and hence operates as a knowledge tool. I also believe that speech, writing, mathematics, science and computing are five separate modes of language, that are distinct but interdependent, and which form an evolutionary chain of languages. Each new language evolved from its predecessors as new information-processing needs emerged that the preceding languages could not deal with effectively. Each builds on the features of its predecessors while adding a number of new information-processing elements of its own. Each new language eventually led to an information explosion and a new set of challenges which set the stage for the next level of development and the emergence of still another form of language culminating in computing or the fifth language. By understanding the chain of events that led to the evolution of language and the emergence of the knowledge tools of speech, writing, mathematics, science, and computing, we will be better able to understand how these tools can be organized to insure the sustainability of human life globally.

Speech, the first form of human language, is the basis of all other linguistic modes of communication and information processing. Spoken language is defined as the sum of information uttered by human speakers. Only the non-verbal forms of human expression, such as music, dance and the visual arts, do not derive directly from speech. Written language, which is derived from speech, is defined as the sum of information which has been notated with visual signs. It differs from speech in that it involves a permanent record, whereas speech disappears immediately after it is uttered. We shall distinguish four different modes or forms of written language: writing [or literature], mathematics, abstract science and computing. Writing and mathematical notations were the first forms of written language and both grew out of the system of recording the payments of agricultural tributes using clay accounting tokens in Sumer just over 5,000 years ago.

Writing and mathematics gave rise to formal education and schoolteachers or scholars who began to generate new forms of knowledge. The information explosion that resulted required a new way of organizing knowledge and information. The language of science and its methodology arose out of this need in ancient Greece some 2,500 years ago. The methods and findings of science are expressed in the languages of writing and mathematics, but science may be regarded as a separate form of language, because it has a unique way of systematically processing, storing, retrieving and organizing information which is quite different from either literature or mathematics. Science generated another information explosion which required a new level of information processing. It emerged only fifty years ago (the early 1950s) in the form of computing, with its own unique cybernetically based and automated methods for processing and organizing information.

3. Social Class and Media

There is a socio-economic dimension to the evolution of knowledge tools. The organization of work and social class structures are both influenced by the evolution of technology, informatics and language. Agriculture led to new forms of labor and its organization, to new settlements and to a two class social system of landowners and serfs. With the rise of the city state and the advent of numeracy and literacy there arose a third class, the middle class. The middle class, as I shall show, are not the middle-income earners but rather the class that adopted literacy and learning as a life style and a way to earn a living. It is also the middle class who developed our knowledge tools and the scientific, philosophical and artistic achievements that have enriched our civilization.

The appearance of social class and the institution of the school is a relatively recent development in the history of humankind's existence. Before the Neolithic revolution some 10,000 years ago, hunting and gathering societies were organized along the lines of clans and tribes. A clan was an extended family, a tribe a small group of extended families working together to ensure their mutual survival. There was no such thing as class structure in these early societies. Social class structures only began to develop with the introduction of agriculture in which a division between the landed or upper class and the peasant or working class took place. The middle or managerial class followed shortly thereafter with the introduction of writing

There are economic reasons for the advent of the two-class system. In a hunting and gathering society it is difficult to preserve foodstuffs, and hence the acquisition of wealth is impossible. Food is preserved basically by sharing. When a family kills a large animal and there is more meat than they can consume, they share it with their neighbors or other members of their clan. This creates bonding between families so that when other families that one shared one's meat with have a large kill they will share their meat with you. Through this system of sharing, the overall survival of the co-operating group of people is enhanced. There is no survival advantage in being selfish in a hunting and gathering society.

With the advent of agriculture and the domestication of animals, the economics of sharing changed. It was now possible to store food both through stockpiling grain and

by maintaining a herd of domesticated animals. There was now a reason to acquire wealth and hoard food. From the point of view of the individual family there was a reason for being selfish as it provided a hedge against starvation during bad times. There was also a reason to acquire land and seize ownership of it. The more land one could acquire the more food one could produce and hoard, and hence the greater one's wealth.

Literacy and the associated formation of a middle class or third class did not emerge in agricultural societies until trading, commerce and an urban form of civilization came into being some 5,000 years later in Sumer. The middle class that emerged as the educated or literate class was that segment of society who were able to derive an economic benefit because of their information processing skills and who served as intermediaries between landlords and serfs. This definition of the middle class does not conform to the common usage of the term by most scholars who regard the middle class as the middle-income earners, but it best describes the role they played in society. They are the class that gave rise to the systematic exploitation of nature through the use and development of knowledge tools. The middle class or literate class gave rise to the notion of humankind's dominion over nature as was first expressed in Genesis: "And G-d said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth". - Gen. 1:26

The invention of the steam engine in 1769 by James Watt allowed the full mechanization of manufacturing and greatly improved transportation through the steamboat and the steam locomotive. This accelerated the level of the transformation of raw materials into consumer goods and began the wholesale assault on the environment and the depletion of our natural resources which has continued to this day in an unending stream of increased consumption. The application of science and technology to agriculture, medicine, and sanitation also contributed greatly to a dramatic increase in population and the standard of living and thereby amplified the problem even more. Beginning with the discovery of electricity in the mid-nineteenth century and its application to the distribution of power the pace of consumption accelerated once again. The increase in sophistication of technology gave rise to an increase in the level of education and the growth of the middle class.

4. Electric and Electronic Media

Electricity also led to the development of the telegraph and other media which created information processing and organizational patterns which were holistic and global. The dimensions of the world suddenly shrank to those of a global village. The study of other cultures and nations suddenly took on new meanings as news from distant events arrived by telegraph almost as they happened and were reported the next morning in the newspaper. The telephone, like the telegraph, increased interpersonal communication over long distances and brought the world closer together. Radio, movies, slide projectors, phonograph records, audio tapes and television provided listening and viewing audiences with a rich panoply of sights and sounds gathered from across the world reinforcing the notion of a global village. The simultaneous flow of information that electricity made possible revealed new patterns and allowed us to see how the

consumptionism of industrial society was destroying our environment, depleting our natural resources and disturbing the ecological balance of the ecosystem of the entire planet.

"Electric speed in bringing all social and political functions together in a sudden implosion has heightened human awareness of the responsibility to an intense degree. In fact it is not the increase of numbers in the world that creates our concern with population. Rather, it is the fact that everybody in the world has to live in the utmost proximity created by our electric involvement in one another's lives." (McLuhan)

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Biographical Sketch

Dr. Robert K. Logan. Dr. Logan obtained his B.S. from M.I.T. in 1961 and his Ph.D. also from M.I.T. in 1965. He spent two years at U. of Illinois as a research associate and came to U. of Toronto in 1967. He is an Associate Professor of Physics. He is a member of the board of the McLuhan Program at U of T.

He is cross-appointed to the Curriculum Department of the Ontario Institute for Studies in Education where he conducts research in computer applications in education and the social impacts of technology and communications. He is a senior fellow at the Faculty of Environmental Studies at York University where he teaches and conducts research in the area of the cross impact of science and the environment. He is an active member of the Pugwash movement.

He was a policy advisor to Prime Minister Pierre Elliott Trudeau and has edited two collections of essays on Canadian politics, The Way Ahead for Canada; and Canada's Third Option.

Dr. Logan is the author of three books on communications cum linguistics: *The Alphabet Effect* (Wm. Morrow, 1986) and *The Fifth Language* (Stoddart, 1995). His latest book, which is an update of The Fifth Language, is *The Sixth Language: Learning a Living in the Internet Age* (Stoddart Press, Toronto, May 2000).

He is the author of numerous articles and studies in many fields including physics, education, communications, science popularization, politics and peace studies. His current research foci are knowledge management and the origins of speech using a chaos theory perspective. Three books are in preparation:

The Collaborative Organization

The Extended Mind: the Origins of Language, Thought and Homo Sapiens

The second edition of *The Alphabet Effect.*