Totalitarian Information Technology and the Age of Information

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Abstract

This paper presents the view that, *as presently deployed*, information technology (IT) can not be considered a legitimate, let alone an essential, component of sustainable development in the 21st century. In spite of its early promise, IT implementations have become corrupted by a general ignorance of, and disinterest in, their societal implications, a naive (often euphoric) belief in IT propaganda, a lack of historical knowledge, and a failure to take future generations into considerations. After presenting an unconventional assessment of the widely-applauded *Age of Information*, this paper defines *totalitarian information technology* as IT which is invasive, pervasive, and invisible, and which is likely, because of these characteristics, to invite, inspire and sustain future totalitarian regimes. The thesis is further advanced that IT has a destructive impact on time, which leads directly to an erosion of family and community values. The main problem is, however, not the technological development *per se*, but rather the fact that the above-mentioned ethical problems created by IT and the Age of Information are still not adequately acknowledged, let alone seriously debated, in academic departments[2] of informatics or computer science. An examination of this situation is made and four steps are outlined: 1) the *long-term societal issues* surrounding the Age of Information must be challenged from within academia, 2) the official and commercial abuse of personal information must become topics for debate, 3) the public must be made aware of the erosive effect that IT has on time and the corrosive impact on family and community values, and 4) the concept of *informational health* must be promoted as a fundamental component of education and public health. It is finally suggested that the proliferation of menacing and irreversible technologies like IT must be met with an attitude of extreme caution and skepticism.

1.   Introduction

As world societies stumble toward the threshold of the third millennium, many potential catastrophes loom large on the horizon. Chief among them, in the opinion of the

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[2] It is noteworthy that there are several non-academic initiatives in Europe, such as *Working Group 4 (Sustainability in an Information Society) of the European Commission's Information Society Forum*, which are including discussion of these difficult issues in their program.

author, is the 'Age of Information', a technological development[3] often hailed as the pinnacle of technological achievement, and an essential component of sustainability. The socio-political dangers of this impending era in human history seem, however, to be minimized and accepted by most as largely unavoidable. This acceptance is no doubt due to the extraordinary utility, and seemingly benign nature, of information technology (IT), helped along by massive pro-IT propaganda. That this technology has undergone uncontrolled and invasive growth[4], making possible an Age of Information, is not questioned. And indeed, the insidious growth of this technology is not even the most immediate problem; the real problem is the strange reluctance, on the part of those who know the technology best, to be critical of it. This reluctance can in part be attributed to the relentless and aggressive propaganda spread by parties who have a vested financial interest in the success of the technology, and in part to the naive view that a commitment to this technology bestows on the user an aura of being up-to-date and professionally competent.

This general absence of criticism has led to a euphoric approach, on the part of many influential professionals, both to IT and to the idea of an Age of Information. As a result, the perceived value of this new technology has become so bloated that anyone who now criticizes IT is considered to be anti-technology, and probably afflicted with technophobia, Luddism, or some other technical inadequacy. The suggestion, for instance, that our current approach to IT and its concomitant systems may be ushering in Huxley's 'brave new world' is met, at best, with a derisive smile, and at worst with outright hostility - as though deeply-held loyalties were being challenged.

IT's negative impact on human society will occur primarily by way of its hypnotic appeal to two sectors of society: a) to users who are unduly impressed with *hyper-this, cyber-that* and *ultra-whatever*, and who have little understanding of, or interest in, the attendant long-term costs, and b) to users whose main interest is in profit, power or approbation, and who knowingly ignore the dangers that IT poses.

The paper proposes that the current (and deplorably enthusiastic) attitude to the coming 'Age of Information' has spurred the metamorphosis of IT into a malignant, anti-democratic tool ideally suited to monitor, manage, control and, ultimately, enslave human beings in a 'brave new global economy' for the 21st century.

But it is not intended merely to list the shortcomings of our technological intelligence - the paper seeks to make a positive, practical contribution to finding long-term solutions. Consequently, it is proposed that, if IT is to be of long-term benefit to human society, then four challenges must urgently be met. First, the uncritical promotion of an 'Age of Information' must be challenged openly, on the grounds that *as presently*

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[3] also referred to as the Information Society

[4] a condition recognized in medicine as *malignant*

configured IT primarily serves power- and profit-oriented interests, and not the fundamental and/or long-term needs of today's and future citizens. Second, the already high risk of official and commercial abuse[5] of personal information is growing rapidly, and the attendant danger to human rights must be debated urgently by informaticians[6] and included in under-graduate curricula. Third, public awareness must be raised with regard to the negative impact of IT on time (and the concomitant erosion of values) as an individual, family and community resource. Finally, the positive potential offered by *informational health*, a simple but innovative approach to the role of information and IT in public health and education, must be promoted. I hope this paper will make a small contribution toward addressing these challenges and help foster a more humane implementation of information technology.

2. The Age of Information

Some time ago, I was asked to give a talk regarding the Age of Information. Although never having been a champion of the concept, I agreed. At first blush, the concept "Age of Information" appears to indicate a revolutionary new and exciting era of life on this planet. While possible problems in an Age of Information are admitted by all, these are seen simply as challenges awaiting technological solutions; the idea of curtailing IT applications for the sake of the health and safety of future generations seems to be unthinkable. In fact, in spite of the above mentioned 'challenges', it is believed that the net impact of the Age of Information is benign, if not downright beneficial. That IT may have a *catastrophic* effect on society is rarely discussed.

I then looked for a chronological continuum which reflected the nature of a sequence of 'ages' into which an Age of Information might fit. I found such a continuum in the main justification for information itself, i.e. that it serve as a basis on which to make decisions. A useful chronological context for the Age of Information is thus 'the basis upon, or commodity with, which decisions are made'.

In developing this idea further, I asked myself: If we are entering the Age of Information, then what age, in terms of decision-making, are we leaving behind? An important question, I thought, as the gradient or dynamic of the continuum was surely a key factor in making sense of the Age of Information. The first clue, regarding the nature of the age just past, came to me when I considered the high esteem accorded today's 'informed' person.

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[5] With official abuse, I mean the pervasive and invisible use of IT-based control systems by bureaucratic, industrial, religious, academic, and political agents intent on maintaining order for the maximization of profit or power.

[6] An 'informatician' is anyone whose professional responsibilities include teaching, research, development, and decision-making in the area of information technology.

My next question then was: In the recent past, *before* we started to applaud the 'informed' person, to whom did we accord high esteem? The answer came to me when I remembered that puerile platitude which could be used to define the Age of Information: "It's not what you *know* that counts, as long as you know where to find the *information*". So it was clear: We have left the Age of Knowledge[7]. No surprises here - in the past, those people who knew and understood things used to be accorded the highest social esteem. But the acquisition of knowledge and understanding takes time, and in this Age of Information there is not enough time to know, to reflect, to understand. So today the profits are made, and power is acquired by those who can access and use information most rapidly. The men or women of knowledge or reason (the philosophers and scientists) have been reduced to playing second fiddle to the businessmen, the corporate 'players', the people who control access to information.

Then it occurred to me to wonder: What 'Age' might be thought to have preceded that of Knowledge/Science? It was clear that the Age of Knowledge followed an age in which those men and women were held in high esteem who had over many years accumulated vast experience, insight and wisdom. This age could thus be described as an Age of Wisdom, a time when the 'wise' were respected.

Since a chronological context for the Age of Information would be more interesting if an extrapolation of the continuum yielded an 'Age' which would logically *follow* the one we were embarking on, I examined the possibilities. Did an "Age of Data" make any sense? An age in which critical decisions were made at the speed of light, by machines. At first it seemed a bit improbable, but then it dawned on me that we had already seen at least two instances of decisions not based on information, but rather on raw data points; decisions made, not by rational people, but by machines programmed to perform certain calculations and act on the results. These instances were SDI (U.S. 'Star Wars' program of satellite-based nuclear or laser weapons) and computerized stock trading. Both times the world narrowly escaped catastrophe.

The graphic describing my speculations is shown in Figure 1. Three 'Ages' are spread along a continuum denoted by 'the basis on which decisions are made'. The dotted line represents the speed of data transfer and decision-making, and the solid line the time available for pre-decision reflection. The dates on the abscissa are merely to indicate a rough time frame. The combination of the two lines is sobering. How can the instantaneous movement of data and elimination of time for reflection lead to anything other than disaster?

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[7] I do not, of course, mean that we have abandoned knowledge; that is clearly not the case. What we scientists have done, I believe, is shown ourselves too eager to hand over control to the champions of IT and to 'tug the forelock' when confronted by the 'informed'.

Basis of Decisions	Age of Wisdom pre 1500 BC	Age of Knowledge fr. 1500 AD	Age of Information fr. 2000 AD

Time available for pre-decision reflection

Speed of information transfer

TIME →

High

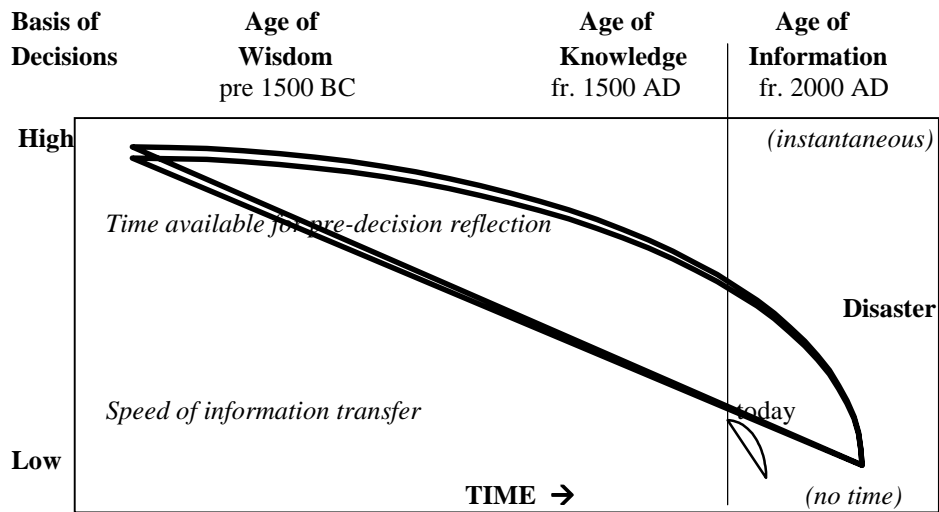Low

(instantaneous)

Disaster

today

(no time)

Figure 1.
Schematic of the 'progression' culminating in the Age of Information.

The negative aspects of the Age of Information must be recognized, examined, openly debated, systematically addressed, and strenuously resisted. Only then can humane societies hope to survive the growing power of those who want to control IT, and with it, personal information and data on its citizens. Informaticians should shift their allegiance from industry to humanity.

Yes, the Age of Information may indeed be upon us, but, in the opinion of the author, it represents an impoverishment of society and a threat to human rights - this must be lamented, not cheered. If we go on the way we are in allowing the unfettered proliferation of IT, our descendants will be at serious risk of being damaged in body and spirit by the machineries of state, of commerce, and of religion. The biggest problem, in this regard, is our deplorably euphoric attitude to the Age of Information: an attitude which is allowing the corruption of information technology into something extremely corrosive: a pervasive, invasive, and invisible cancer-like technology. This form of IT, referred to herein as totalitarian, is defined and discussed in the following section.

3. Totalitarian information technology

It was inevitable that the astronomical rate of improvement in the cost:performance ratio of IT would bring about incredibly profitable opportunities for the developers and vendors of the technology and its applications. The innumerable, mostly unnecessary, and often damaging, products which are available today are the result. When computers, and their related electronic gimmickry, were applauded by the technological *cognoscenti*, managers had little option but to believe in the value of the products subsequently forced on them by an aggressive IT industry. Developers and manufacturers of computer hardware and software became 'players' overnight, and a process began which would see a useful technology corrupted into one which lends itself readily to authoritarian abuse: totalitarian IT[8] was born.

How this happened is, with hindsight, easy enough to understand. Reacting to the flood of available products and systems, the more aggressive managers, purchasers and implementers of IT were rewarded by achieving higher levels of influence and power within their organizations with a speed hitherto unheard of in management. Before long, every kind of organization from commercial to governmental was irretrievably committed to IT. The increasing speed and complexity of IT development resulted in the forced upgrading and repeated replacement of systems which, although still adequate to do the job, were judged to be inferior in speed and sophistication to the technology being installed in the offices and factories of the competition. The enslavement of enterprise by a totalitarian IT was underway.

What happened next is not so obvious, but it seems that as soon as the widespread use of IT seemed unavoidable, IT also became '*the right thing to do*' and therefore unassailable. Information and information systems became the backbone of the management paradigm[9] towards the end of the 20th century; and IT is today fanatically defended by those with a direct or indirect interest in maintaining this paradigm. What followed was the moral resignation of many informaticians. I say 'moral' resignation because, in their subservience to a technology, they compromised their objectivity as scientists.

Unless we expose the growing danger of totalitarian IT, it will continue to sink its claws into the social structure, and thus present a growing threat to human rights. In his books, Joseph Weizenbaum[10] makes the point that, as academics, we have a re-

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[8] Totalitarian IT: an invasive, invisible and pervasive version of IT which invites and supports authoritarian and commercial abuse (the author's definition)

[9] An encouraging sign is a growing number of articles in the management literature which question the economic value (pay-back) of the massive and growing investment in IT.

[10] This computer scientist had the early insight and great courage to proclaim publicly that IT is dangerous (Weizenbaum, J. 1976. "Computer Power and Human Reason: From Judgment to

sponsibility to be vigilant and vocal where the potentially negative impact of a technology on human rights is concerned.

An example of how human rights might be compromised is not hard to conceptualize. A future regime may be interested in keeping track of the expenditures and whereabouts of their citizens, ostensibly for the purpose of protecting the public against fraud, theft, kidnapping, tax evasion, etc. This would be made possible by *integrating* such monitoring (control) technologies as cash cards, electronic banking, bar-codes, and GPS (all of which are now in common use). It does not require clairvoyance to recognize the abuses which an authoritarian regime could commit with such IT if adequate legal and technological safeguards are not put in place. To argue and militate for the establishment of such safeguards should be the duty and responsibility of all knowledgeable professionals and academics, especially informaticians.

The above scenario is not futuristic. Governments all over the world already have super-computers capable of collecting, archiving and 'mining' massive databases and data-warehouses of personal information. This ability to delve (on a whim, at no cost, and at lightning speed) into vast reservoirs of data collected over the years on all members of the public, seems to violate natural justice and good sense. The collection, storage, and analysis of such data occurs daily against the will, and often without the knowledge, of the public. This is surely an outrageous act of aggression against personal liberty - yet, the technology is so firmly 'in the saddle' that it appears to be futile to resist - and, hence, the outrage is nowhere to be felt.

The encroachment by IT of personal privacy is also already well underway. Daily there are stories about the invasiveness of IT, e.g. about automatic fingerprint-scanning being required for cheque-cashing, about governments passing legislation (the Clipper chip) to forbid unbreakable encryption, and about employers, insurers and credit agencies having the right, and the computer-capacity, to acquire and archive (in data warehouses) personal information about consumers.

Again, it must be said that in Europe there is at least some evidence that these questions are being considered. In 1994, the German Gesellschaft für Informatik took a formal position on ethics. It adopted a set of *Ethical Guidelines* which begin, at least, to deal with the question of professional responsibility in the realm of informatics. Article 7 ("Beteiligung") is particularly noteworthy, as it addresses (my translation) "the responsibility of members in a position of leadership with regard to the expectation that they will help to ensure that those who will be affected by the introduction of an information system will be able to participate appropriately in the design of the

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Calculation". W.H. Freeman). Unfortunately, two of his books "Kurs auf den Eisberg" and "Wer erfindet die Computermythen: Fortschritt in den großen Irrtum", seem to be available only in German.

system and in the determination of conditions of use; and that they *will not permit the implementation of control-technologies without the participation of those affected*" (emphasis added). To what extent it is a realistic expectation that the members of this organization will be able to apply such worthy ideals in practice is, of course, another question entirely.

Neil Postman, one of the important commentators of this century on the subject of technology and society, said, in speaking to the Gesellschaft für Informatik:

Technological change ... always results in winners and losers. ... In the case of computer technology, there can be no disputing that the computer has increased the power of large-scale organizations like military establishments or airline companies or banks or tax collecting agencies. And it is equally clear that the computer is now indispensable to high-level researchers in physics and other natural sciences. But to what extent has computer technology been an advantage to the masses of people? To steel workers, vegetable store owners, teachers, automobile mechanics, musicians, bakers, brick layers, dentists and most of the rest into whose lives the computer now intrudes? These people have had their private matters made more accessible to powerful institutions. They are more easily tracked and controlled; they are subjected to more examinations, and are increasingly mystified by the decisions made about them. They are more often reduced to mere numerical objects. They are being buried by junk mail. They are easy targets for advertising agencies and political organizations. The schools teach their children to operate computerized systems instead of teaching things that are more valuable to children. In a word, almost nothing happens to the losers that they need, which is why they are losers.

It is to be expected that the winners - for example, most of the speakers at this conference - will encourage the losers to be enthusiastic about computer technology. That is the way of winners, and so they sometimes tell the losers that with personal computers the average person can balance a checkbook more neatly, keep better track of recipes, and make more logical shopping lists. They also tell them that they can vote at home, shop at home, get all the information they wish at home, and thus make community life unnecessary. They tell them that their lives will be conducted more efficiently, discreetly neglecting to say from whose point of view or what might be the costs of such efficiency.

Should the losers grow skeptical, the winners dazzle them with the wondrous feats of computers, many of which have only marginal relevance to the quality of the losers' lives but which are nonetheless impressive. Eventually, the losers succumb, in part because they believe that the specialized knowledge of the masters of a computer technology is a form of wisdom. The masters, of course, come to believe this as well. The result is that

certain questions do not arise, such as, to whom will the computer give greater power and freedom, and whose power and freedom will be reduced?[11]

But let us assume that Postman's 'losers' do not all succumb - that, sooner or later, some of these losers unite in a resistance movement, and try to re-establish a system more respectful of human rights[12]. When officials, armed with the latest in IT, discover that there are people who wish to expose and/or overthrow their totalitarian control over the people, they will likely considered these people to be enemies of the state and pursued relentlessly, with all of the IT available to the state. When, as they have done so often in the past, these freedom-fighters try to go underground they will be unable to hide - technology will have made it impossible to hide their activities from the authorities. We have already done serious damage to our ability to hide from the oppressor - why are we not more concerned when we are about to lose the little bit of anonymity we have left?

To judge on the basis of history, tyranny (whether by government, commerce or religion) is something that people in *all* countries, not just eastern European or African ones, should worry about. But there exists in the public, and among professionals, a profound ignorance of history; this is compounded by a tragic lack of critical thinking. We should all re-read *1984* and *Brave New World* so as to remind ourselves what the indiscriminate use of IT may lead to as we enter the 21st century.

Can this be prevented? I don't know; but I believe that, as academics and informaticians, we have the opportunity, the ability, the mandate, *and the duty* to do everything possible to deny future tyrants access to totalitarian IT - the tool they would want, first to monitor, then to control, and finally to enslave, their citizens.

4.   Human values are jeopardized by totalitarian IT

In the drive for technological gratification, we seem to have sacrificed some of our most valuable principles, e.g. authenticity, variety, smallness, slowness, and simplicity, in favour of their pathogenic counterparts: facsimile, uniformity, 'economies of scale', speed, and complexity. While the latter are all highly touted as components of the efficiency demanded by globalization, they will, it is suggested, bring about a cumulative and irreversible erosion of humane principles and quality of life - which, es-

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[11] Postman, N. 1990. *Informing ourselves to death*. Paper given at the 1990 meeting of the Gesellschaft für Informatik; Stuttgart.

[12] I was tempted to follow Postman's lead and use the word 'freedom' in this context, but my close friend, Berlin Gestalttherapist Margaretha Goebel, suggested that this term carries too much 'baggage' and is best avoided in this discussion of the socio-political aspects of the abuse of information technology. Her valuable contribution to this paper is much appreciated.

pecially for future generations, may result in a sharp curtailment of human rights. And all of this for little more than increased efficiency and the concomitant increases in profit, power and control. This development should be challenged openly and vigorously.

Neil Postman reminds us[13] that a moral frame work is more important to "meaningful and humane" lives than the information made available by computers:

> *(W)hat causes us the most misery and pain - at both cultural and personal levels - has nothing to do with the sort of information made accessible by computers. The computer and its information cannot answer any of the fundamental questions we need to address to make our lives more meaningful and humane. The computer cannot provide an organizing moral framework. It cannot tell us what questions are worth asking. It cannot provide a means of understanding why we are here or why we fight each other or why decency eludes us so often, especially when we need it the most. The computer is, in a sense, a magnificent toy that distracts us from facing what we most needed to confront - spiritual emptiness, knowledge of ourselves, usable conceptions of the past and future. Does one blame the computer for this? Of course not. It is, after all, only a machine. But it is presented to us, with trumpets blaring, ... , as a technological messiah.*

But how can there be "an organizing moral framework", how can there even be any discussion of values, when in industrialized countries there is often no *time* for anything. No time even to enjoy communal meals, let alone meditate or reflect? A critical examination of the family in industrialized countries will reveal the increasing disappearance of time from family and community resources; and without time there can be no "moral framework" and no retention of fundamental values.

Technology in general, and IT in particular, claim, at every turn, to save time, to create more efficient procedures, even to 'make' time. But this is a false promise. When, due to automation or IT, the time required to do a specific job is reduced by factors of 10, 100, or even 1000, the workers and their families never derive the benefit. In fact, the increasing productivity allowed by IT often causes a rebound effect[14] which results in a demand for more improvements and more cosmetic alterations to the products of IT-mediated manufacture, requiring an ever greater investment of time and other resources. The main beneficiaries of the time 'created' by IT are the owners and

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[13] Postman, *ibid*.

[14] The 'rebound effect' is active when resources (time, material, etc.) which have theoretically been liberated or made available by efficiency-related advances in technology are reinvested "to such an extent that it massively overcompensates for the original technological progress made, and essentially eliminates the potential overall reduction in resource use." *Sustainability in the Information Society*, by Working Group 4 of the Information Society Forum, European Commission, Brussels, 1998.

managers of the means of production - they will indeed have more time - at their estates, on their yachts, in their chalets, and for travel.

Anyone who has tried to combat the insidious influence over children currently exercised by manufacturers, together with the advertising media, will know that, while this is possible, it requires a major commitment of time. And while time was always available in the past, totalitarian IT has today wiped out the time needed by parents to redirect the interests of their children in the direction of less mind-numbing products and activities. Because this trend has also destroyed the time necessary for discussions and reflection, for prayer and meditation, for play with spouse, children and friends, these important activities are no longer key among the values of life in industrialized society. This, in turn, has led to the emergence of whole generations without a sense of shared community and personal values. The role of IT in this decay must become part of academic debate, in informatics also.

5.   Informational health

The basic premise of the concept of *informational health*, as proposed herein, lies in the recognition that information is a nutrient, like food and water, and that the nature and amount of information one consumes, as well as the 'enzymatic processes' with which it is processed (digested), determines one's state of informational health. That information is an essential nutrient becomes more obvious when you define an essential nutrient as something the body needs to take in on a daily basis in order to survive.

What is not appreciated adequately is that there must be a capacity to understand, to cope with, to manage, and to avoid information. Postman suggests that

The tie between information and action has been severed. Information is now a commodity that can be bought and sold, or used as a form of entertainment, or worn like a garment to enhance one's status. It comes indiscriminately, directed at no one in particular, disconnected from usefulness; we are glutted with information, drowning in information, have no control over it, don't know what to do with it. (ibid.)

Our challenge as informaticians in academia must be to help ourselves, and the public at large, control our consumption of, or confrontation with, information, and to learn what to do with it when we have it. The concept of 'informational health' was developed by the author to give these processes a name.

People who are informationally healthy are able and willing a) to discriminate between useful and useless information, between credible information and propaganda, between life-enhancing and life-degrading information, between wholesome and toxic information, between stable and volatile information, between information that in-

spires love and spirituality and information that is conducive to hate and violence, between information needed for survival and that what is merely desired for enhanced enjoyment, and b) to choose among these options so as to increase their own and their families' and communities' chances of thriving physically and spiritually, and at the same time enhance their long-term prospects of a life free of totalitarian control.

If you accept this definition, then the collective state of informational health of a population is a crucial aspect of their public and political health. It is useful to consider to what extent nutritional and informational health may be analogous. Looking at the nature of nutritional health, we are familiar with a wide range of attributes related to the quantity and quality of the nutrients consumed; informational health can be described in like manner (Figure 2). With regard to malnutrition or food poisoning, there is immediate recourse to research and the development of remedial programs. Unfortunately, the various types of informational ill-health, which also have serious implications for human health, and which need to be addressed urgently, do not seem to merit such intervention.

	Input	
Attribute	Nutrition	*Information*
With continuous access to adequate, balanced input →	*people would enjoy*: nutritional health	*people would enjoy: informational health*
but if the input is: not available	*people would suffer from:* starvation	*people would suffer from: ignorance*
too little	malnutrition	*lack of information*
too much	indigestion, obesity	*information overload*
unbalanced	vitamin deficiency, etc.	*being mislead by ads, propaganda, etc.*
bad, toxic	food poisoning, etc.	*being poisoned by lies, pornography, etc.*
worthless	empty calories	*being inundated with useless information*

Figure 2. Comparison of nutritional and informational health in terms of quantity and quality of the available input - food or information.

The deplorable state of informational health of the world's democracies[15] should long ago have given rise to a thorough investigation of what information people need to live as effective citizens of a democracy. It must be assumed that there are too many interests who are disinclined to promote the informational health of the average citizen - as it would not suit their own nefarious purposes. For this very reason, a research area or discipline dealing with the topic of *informational health and human rights* is well overdue.

Totalitarian IT cannot develop in a society whose citizens are informationally in good health. So, when citizens becomes concerned with their informational health, then a human(e) civil society can thrive. This approach assumes, of course, that consumers care enough about the damaging impact of totalitarian IT to make the necessary investments in time, money and effort to actively 'seek out' healthy information, rather than passively 'soak up' pathogenic information, which is what advertisers would prefer us to do.

That information available over the Internet is a beneficial nutrient is of course debatable. Here I refer once again to Neil Postman:

> *The message is that through more and more information, more conveniently packaged, more swiftly delivered, we will find solutions to our problems. And so all the brilliant young men and women, believing this, create ingenious things for the computer to do, hoping that in this way, we will become wiser and more decent and more noble. And who can blame them? By becoming masters of this wondrous technology, they will acquire prestige and power and some will even become famous. In a world populated by people who believe that through more and more information, paradise is attainable, the computer scientist is king. But I maintain that all of this is a monumental and dangerous waste of human talent and energy. Imagine what might be accomplished if this talent and energy were turned to philosophy, to theology, to the arts, to imaginative literature or to education? Who knows what we could learn from such people - perhaps why there are wars, and hunger, and homelessness and mental illness and anger. (ibid.)*

Another obstacle to informational health can be seen in the low priority given to the critical examination of the *long-term social impact* of IT in most informatics or computer science curricula.

In the realm of food and nutrition, there are courses, diplomas, and whole university programs the purpose of which it is to assure that the nutritional needs of the human

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[15] That informational health in dictatorships is poor is to be expected; what people in democracies don't realize is that they could lose their democratic rights if they are not more attentive to the erosion of humane principles caused by abusive use of totalitarian technologies, especially IT, by bureaucratic, commercial and other interests.

body are understood and satisfied. Surely human rights and values are as important as physical nutrition; if so then any threats to human rights and values occasioned by poor assimilation of information deserve as much, or more, attention as do threats to nutritional health. But informational health is getting *no* attention. It is therefore proposed that future curricula in informatics include, as a required part of the program, an investigation and assessment of the societal role and function of information and information technology.

The academic debate on informational health will not occur easily, as there exist some significant barriers to critical consideration of this and the other issues mentioned above. Most prominent among these barriers is a lack of interest in history and philosophy, caused in part by the politically correct trend, in Canada at least, to make post-secondary curricula 'more relevant to the community' (read 'sensitive to the needs of the employer'). This has, in the opinion of the author, resulted in a sharp decline in the quality and generality of a university education. Today, vast numbers of university students are culturally illiterate, socially incompetent, politically apathetic, ignorant of history and philosophy, and economically preoccupied with getting a good job. A fundamental revision of post-secondary (and secondary) curricula is urgently necessary if the proposed concept of informational health is to take effective root. As a start, I would recommend that books such as those by Weizenbaum[16], Kizza[17], Slack and Fejes[18], should be required reading for all undergraduates, not only those in informatics and computer science.

6.   Conclusion

Our challenge with regard to totalitarian IT and the Age of Information must be to see clearly, think critically, and to speak up publicly. We must adapt the Brundtland Commission's statement regarding sustainable development and apply it to sustainable information technology: "Current generations should meet their needs without compromising the ability of future generations to meet their own needs."[19] We must *not* simply go on adding to the arsenals of those who may want to build a global economic system in an Age of Information, even if it means curtailing the rights of individuals.

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[16] Weizenbaum, J. 1976. *Computer Power and Human Reason: From Judgment to Calculation*. W.H. Freeman.

[17] Kizza, J.M. 1997. *Ethical and Social Issues in the Information Age*. (Undergraduate Texts in Computer Science). New York, Springer.

[18] Slack, J.D. and F. Fejes (eds.). 1987. *The Ideology of the Information Age*. Norwood, NJ, Ablex Publishing.

[19] Our Common Future; World Commission on Environment and Development. Chaired by Dr. Gro Harlem Brundtland, now Director General of the World Health Organization.

We must put the highest priority on protecting ourselves and our descendants against control by means of totalitarian information technology. Many excellent writers[20] are addressing some of these ideas; there now needs to be a more explicit shift in this direction, especially by academic informaticians.

In designing a nuclear power plant, the nuclear engineer works on the basis of the GAU, or *grösster anzunehmender Unfall*[21]; and in designing a software application, I have been told that the software engineer assumes the DAU - or *dümmster anzunehmender User*[22]. I believe that we are entitled to ask the question: Why, when it comes to the society-wide implementation of potentially hazardous IT applications, are we not constrained by the BAU, or *bösartigstes anzunehmendes Unheil*[23]?

Taking the BAU approach, I believe that when it comes to the development and proliferation of an irreversible and potentially dangerous technology like informatics[24], the ethically and logically most defensible attitudes are *extreme caution* and *skepticism*. When coupled with a recognition that it is always better to err on the side of less, rather than more, technology, this attitude[25] may, if widely held, help us survive as a democratic and humane society. The price of such an approach will, of course, have to be paid. The consequence of renouncing the totalitarian form of IT will, for some, be severe: less efficiency for the manager, less control for the bureaucrat, less power for the advertiser and propaganda monger, and less profit for the investor. It ultimately comes down to human values and societal priorities. As we enter the final days of the 20th century, academic informaticians should give some thought to these priorities and, at least, be willing to explore critically the real meaning of the Age of Information.

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[20] The following excellent books are also critical of information technology:

Brook, J. and I.A. Boal (Eds.) 1995. Resisting the Virtual Life: The Culture and Politics of Information. City Lights, San Francisco.

Mander, J. 1978. Four Arguments for the Elimination of Television. New York, Morrow Quill.

Roszak, T. 1994. The Cult of Information: A Neo-Luddite Treatise on High-Tech, Artificial Intelligence, and the True Art of Thinking. Berkeley, University of California Press.

Stoll, C. 1995. Silicon Snake Oil: Second Thoughts on the Information Highway. Doubleday.

Vallee, J. 1982. The Network Revolution: Confessions of a Computer Scientist. And/or Press.

[21] biggest conceivable accident

[22] dumbest conceivable user

[23] worst (or, more precisely, 'most malignant') conceivable disaster

[24] Genetic engineering and nuclear power are other examples.

[25] It would not be unreasonable to consider this a neo-Luddite attitude.