



Classic Reproduction

EIES, Racter and Beyond

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An Introduction by Sohail Inayatullah, 15 May 2026

Reading this piece from Jim is like stepping back into the warm intellectual currents of Hawai'i, a time and place that shaped so much of my own journey. It's a profound reminder of his foundational role, not just for me personally, but for the entire field of futures studies.

It is a journey back to the source code of so much of what we now take for granted. For those of us who had the privilege of being at the University of Hawai'i during those formative years, this essay is a powerful evocation of a time when the future was crackling in the air, transmitted through telephone lines and nascent computer networks. It takes me right back.

What strikes me most is Jim's core insight, which he has championed for decades: "Changing how we know changes what we know and who we are." This isn't just an academic statement. Jim lived it. He didn't just study computer conferencing; he became, as he says, an addict. He experienced the transformation in his own being, in his relationships, in his daily rhythms. This is the essence of transformative foresight – it's not a detached observation of the world, but an engaged, embodied practice of creating it.

I remember arriving in Hawai'i and being immersed in this very milieu. Jim was always the one pushing us to try the technology, to not just talk about the future but to feel its pull and its weight in the present. His work on EIES and Racter was happening just as I was writing my first paper on the futures of death and dying and later, my work on the legal rights of robots. The questions he was grappling with – about AI, about virtuality, about what it means to be human in a technologically saturated world – were the very questions that animated our discussions and set the trajectory for my own research. He planted the seeds.

His journey from word processors to video and his lament that visual literacy was set back, resonates deeply. It's a classic Dator provocation – challenging the linear story of progress and pointing out the alternative futures we lost along the way. His analysis isn't just about the technology itself – the litany of change. It goes deeper. He shows us the systemic shifts, how the World Futures Studies Federation had to grapple with the new politics of access and exclusion. He uncovers the worldview conflicts between print-based reason and the emotive "Dream Society." And he reveals the deep metaphors that guide us, whether we are seeing the world through the lens of a "jet airplane" or as a "network nation."

This essay is a masterclass in futures thinking because it does what Jim has always taught us to do. It maps the past, present and future. It anticipates disruption. It understands the timing and patterns of change. And it deepens our understanding by linking the empirical world to the stories and myths that give it meaning.

He concludes by looking toward a future of "speaking cell," moving beyond our human-exceptionalist cul-de-sac. This is Jim in his quintessential form: even while reflecting on the past, his gaze is fixed on the next transformation, the next frontier of what it means to communicate and to be. It connects directly to the call for a new, planetary humanism, one that expands our sense of self and community.

For the Journal of Futures Studies, this piece is more than a historical artifact. It's a living document from one of the great forest-builders of our field. Jim Dator didn't just predict the networked world; he was one of its pioneering architects and he showed us that to truly understand the future, you have to be willing to log on, to be changed by it

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and to help co-create it. We are all still living in the world he began to map out all those years ago.

EIES, Racter and Beyond

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In January 1980, I presented a paper titled, “EIES and Racter and Me—Computer conferencing from a Pacific Island,” at the second Pacific Telecommunications Conference, in Honolulu, Hawaii. In April, 2026. I ran across a copy of the paper, and thought that the ongoing futures community might like to reflect on reflections on a very early example of “computer conferencing”. The editors of the Journal of Futures Studies agreed, asking that I also compose a reflection more broadly on what I had written then, and now. What follows is my paper exactly as I wrote and delivered it in 1980. This is followed by a commentary on the way technological changes, broadly defined, cause personal, social, and environmental changes, giving several examples. I conclude with remarks about the futures of the (largely communication) technologies I discussed.

EIES AND RACTER AND ME—COMPUTER CONFERENCING FROM A PACIFIC ISLAND

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Of all the modern technologies that touch upon my life, none are more important to me professionally than the jet airplane and computer conferencing. More than anything else, these two technologies have directly made it possible for me to participate quickly and effectively in academic, political, and personal affairs globally dispersed even though my home is 4,000 miles away from any major population base. This report summarizes and evaluates some of my experiences with computer conferencing systems (primarily the Electronic Information Exchange System—EIES—through the New Jersey Institute of Technology, developed by Murray Turoff), and announces an intended use of computer conferencing (CC) in the immediate future.

Starr Roxanne Hiltz and Murray Turoff, in their seminal volume, *THE NETWORK NATION: Human Communication via Computer* (Reading, Mass: Addison-Wesley Publishing Company, 1978), discuss, in Chapter 3, “Social and Psychological Processes in Computerized Conferencing.” After summarizing the psychological and social characteristics thought by researchers to be present in face-to-face (ftf) situations, they present and evaluate those found in their CC system, EIES. They note that most of the various “cues” present in ftf situations are absent in CC. These include a wide variety of audible and visual cues such as age, sex, social status, ethnicity, accent, disability, attractiveness, sobriety, cleanliness, smell, facial expression, emotion, eye contact, body movement, alertness, nervousness, and many, many other things that (generally unconsciously) are so important in ftf situations over and above the specific “information” contained in the verbal “messages.”

Yet, equivalent cues in CC messages by experienced CC users are by no means absent. Hiltz and Turoff have noted some of the devices that CC users have developed to make their messages more psychologically and socially acceptable—more “human” and “natural.” They summarize their findings as follows:

Users evolve specialized norms with respect to the use of the facilities and communications and writing style. The acquisition of these norms by individual users and groups appears to be an important learning process on such systems.

User participation in conferencing in an active sense of contributing items seems to require some degree of usage above the basic level of learning the mechanics. This may be a second-level learning plateau involving the acquisition of norms established by the user communities.

Users will gain facility as time passes, so that their input rates become higher than usual typing rates. For large groups, the time required to send and receive communications will drop below that required for other media, such as telephone or face-to-face meetings.

The user's short-term memory may be a factor in conditioning frequency of interaction with the system.

Users will tend to become conditioned to sign on the system so that on the average they have about seven items to send or receive per interaction.

In accordance with social exchange theory, no participant will continue to use a conferencing system unless his/her "rewards" are greater than his/her "costs." Among the factors that increase reward for users are:

- (a) Ratio of items received to items sent. This increases with (i) size of active group; (ii) throughput rate of the system.
- (b) Observable increase in skill and speed in using the system. This improvement is related to the richness of the design in terms of advanced features available to users once they have mastered the basic mechanics.
- (c) Importance of communication with system members in comparison with communication with persons not on the system; relative cost in time and money of other modes for communication with people on the system.

On the level of the social dynamics of group interaction through this communication medium, our hypotheses (inductions from preliminary data) include:

- There is a strong tendency toward more equal participation in asynchronous discussions, as compared to face-to-face groups.
- More opinions tend to be asked for and offered.
- There is less explicit agreement or disagreement with the opinions and suggestions of others.
- There is a great deal of explicit sociability of an informal sort on these systems.
- There are no significant differences in overall satisfaction of participants in face-to-face, audio, video, or computerized conferences.
- There tends to be a great deal of "electronic migration" among user groups on a CC system. (p. 124f)

In the past 18 months or so that I have been on the EIES system, I have used CC for many different purposes: as electronic mail in lieu of letters or telephone calls to personal and/or academic friends across North America and Europe; to plan agenda for subsequent ftf meetings; to pre-discuss substantive issues in order to present them more fully-developed in subsequent ftf meetings; to facilitate a sense of global unity during a transnational week-long simultaneous symposium; to conduct formal business meetings of a research institute; to co-author subsequent publications and to critique drafts of other persons' writings; and, most importantly of all, to participate actively in some twenty different conferences via computer on a wide variety of topics, often participating in as many as 15 such conferences at one time.

I have plainly become addicted to CC. It has "changed my life" in terms of how I spend my time daily; to what issues I devote my teachings and research; from whom I get, and to whom I give, information; who my "friends" are; as well as what some of my new satisfactions and frustrations are.

Upon coming to my office at the University of Hawaii in the morning, the very first thing I do is log on the system to receive private messages and new information on any active conferences I am in. The last thing I do before going home is to check the system for messages. I may pop in for a brief "fix" one or two times during the day, and frequently at odd hours during weekends and holidays.

The thought of being denied continued access to EIES (that is dreadfully possible: the NSF grant to Joseph Martino through Murray Turoff that has paid for my participation so far runs out April Fools Day, 1980), is almost too horrifying for me to contemplate, so hooked on the system am I.

And I am not alone in this respect. Several of the EIES conferences are devoted specifically to “Talk About Talk” or “Impacts” of the system on the users.

On one of those conferences, there was considerable discussion about the impact of CC on the family lives of those persons who have terminals in their homes; how this might eventually lead to almost all white-collar-type “work” being conducted at home, and how that future development might impact the family; who in the home has access to the terminal, and how this might impact the status/information structure of families; and finally how this access and/or lack of it—might lead to the development of “super-literacy” on the one hand and a new deprived minority (or majority) on the other.

Here are some excerpts from the discussion about the first of those topics:

Suddenly, a new element has been thrust into the household. Normal family patterns are altered and supplanted by the active user’s affair with the terminal. Active users themselves refer to the phenomenon as “addiction,” and given that admission, it is by no means surprising that other family members show concern.

This is not simply a hobby: it portends a new lifestyle or career that can be frightening to those who are not participating.

Computer conferencing differs, perhaps, in the nature of the networks that are formed through it. These undoubtedly appear alien to prior experience. The family participates in conventional community networks, accepts the vocational network. But the CC network is different: it exists in the electronic ether; disembodied communication takes place; evidence indicates that new friendships are being formed in new ways; the network has all the appearances of being a cult with strange passwords, rites of initiation and passage, its own peculiar conventions and ceremonies. And it is practiced daily or there is a gnashing of teeth when it is not accessible.

For the family, this may be the first true exposure to just what does transpire on the job. Formerly, reports of vocational activities were highly filtered.... The member did not bring back the day’s mail and memoranda for family perusal, present transcripts of the day’s telephone calls, or provide a tape recording of the frequently banal conversation that took place over lunch.

If this is going to be a “Network Nation,” then the frustrations and anxieties of some family members...could represent just the tip of the iceberg of the conflicts that will come about as home use of computer terminals becomes more widespread among the general populace.

(Robert Bezilia, January 9, 1979)

My first reaction on reading Robert’s entries...waIO,/s that he’s reflecting the perspective of the traditional intact nuclear family.... My own situation as a single parent is very different.... To try to generalize this, I suspect that the impacts on the family are very different, varying by such factors as marital status, traditionalism, size, age of members, etc., etc.

Telecommuting would enable the parent responsible for child care to have a flexible schedule. Since this is usually the wife, it would mean that women could work without the constant crisis of what to do if the school closes for holidays or the child is sick, or the baby-sitter does not come. Moreover, with the main wage earner working in or near the home, he or she can spend more time with other family members, and conceivably perform a greater share of the household maintenance tasks that are now mostly allocated to women. Spending more time together would increase interaction among family members and might strengthen their relationships. This change will require new arrangements for avoiding conflict and strain if it is to have positive rather than negative effects. (Elaine Kerr, January 10, 1979)

...The notion that people working at home is “new” seems silly to me. Zillions of self-employed people

hang around the house all day....

(Lee Sailer, January 14, 1979)

We believe that the real question here is how people living together in a household (whether nuclear family, single-parent family, unrelated adults, couple, commune, or whatever) work out how they spend their time and energy together.

.... If our children and spouses all had at the touch of the keyboard the same rich smorgasbord of possible interactions that those of us using the system for “professional work” do, then some of the questions that Robert and Elaine have raised could be put to some real tests.

(Peter and Trudy Johnson-Lenz, January 15, 1979)

Having a terminal at home, and communicating with a special community via EIES, is important to me and is a fact of my family life. But it seems relatively unimportant in so far as it affects that life.

(August Martin Wildberger, January 15, 1979)

It seems to me that CC will worsen the detrimental strain that TV and other relatively modern technical developments have put on family bonds. People now spend hours watching an impersonal TV screen when they could be conversing or engaged in some other kind of personal activity involving family members or friends (the kind that you can see).

(“RaelI,” January 16, 1979)

...Unlike TV, CC is interactive, and therefore capable of fostering connectedness....

(Elaine Kerr, January 16, 1979)

Here I am, awake again. All this week I have had dreams that involve CC. Either I’m at the terminal, or else the dream has some other EIES flavor to it. This seems a little alarming. Any dream analysts out there? Freudian interpretations?

(“Dream Weaver,” January 22, 1979)

Needless to say, “Dream Weaver” found plenty of people willing to interpret his dreams. Meanwhile, OMNI magazine opened a brief but exciting conference on “Superliteracy” with the following statement:

The term “Superliteracy” was coined to embrace a suite of themes including personal computing, computer-based textual communication, hypertext relational knowledge bases, and the current transition from transportation wheel-works to “telematique” networks. The term Telematique was selected to reflect a humane and cultural image of the emerging networker within a mosaic of distributed intelligences proliferating through the computer-based communications systems of the industrial West.

...The integration of computers and communications, by changing the fundamental mode of social transaction, portends a transformation as significant as the neolithic invention and implementation of the wheel and the writing system. To characterize this change as “post-industrial” is like defining the early planters and herdsmen as “post-hunters and gatherers.” We need to “zoom-back” to an evolutionary scale in order to perceive the emergence of a “metaltic” age in human cultural evolution and to define those key attributes that differentiate one age from the other.

I propose that the key attributes of the metaltic concept with its superliterate societies are (among others) the

following:

1. "Transpersonality" of literate communications. This is a "social-action-at-a-distance" type of attribute.
2. "Dimensionality" of Text-spaces. This is a corollary of the Shannon communication theorem where, instead of gaining reliability by introducing redundancy, we gain flexibility/extensibility by introducing connectivity.
3. "Distributed Topology" of literate transactions. This is the multiplication of source and destination nodes.
4. "Virtuality" of telematic systems architecture. This is the ascendance of the logical over the physical ("Omnicon-Organizer," August 27, 1979)

To me, the term super-literacy in the context of CC and telecommunications involves much more than reading, writing, typing, and/or "computer literacy." It also concerns how one structures text and makes it available.... Super-literacy involves the skill with which one "knows" only electronically. This begins to get at the interesting transpersonal possibilities of CC systems.

...Jacques Vallee has called CC an "altered state of communication," and he also speaks of an "information singularity," where space and time collapse, and all information is available at one's fingertips. ("Red," September 6, 1979)

Not everyone who has used EIES is quite so enthusiastic about it, or about the possible future impact of it upon humanity. "At this stage in its short life, EIES can be categorized with all the other expensive electronic gadgets on the market. It serves no useful purpose. It's cute and fun. Nothing more."

(Anonymous, August 28, 1979)

I have not had to wade through such drivel since high school literary magazines. What makes you guys think this is in any way the wave of the future? I had thought we would be attempting to talk sense about the complications and alternatives...in a future world of instant interconnected text. Instead, we have this invitation-to-the-dance, tra-la-la, nuts-in-May stuff, where it's great to be superliterate, are you as high as I am? sort of remarks....

I have always been of the impression that "literate" meant being able to read and write. The latter practice includes spelling. I am shocked to see spelling like that already in our conference, and astounded that illiterate remarks are being offered on the nature of "superliterate" societies. Is it the case that one can be superliterate without being literate?

(Ted Nelson, October 13, 1979)

Other people have been concerned about unequal access to computer conferencing—this being the opposite side of any possible development of "super-literacy." Should free or very low-cost computer terminals be available for public use in libraries, schools, shopping centers, etc? Should instruction in "computer literacy" become a major part of formal education? Should further development on CC be halted until presently-disenfranchised groups (minorities, poor, handicapped, Third World) persons be brought into the development process so that the resulting system will not have a "upper-middle-class-male-white" bias built into it? Or is this technology "culture free" and essentially independent of such issues?

One of the hottest issues discussed over Computer Conference 30 in preparation for the World Future Study Federation's Conference on "Science, Technology, and the Future" (held in Berlin in May 1979) was whether or not, since so many representatives of Third World nations were to be present at the Berlin meeting, we should have a demonstration (which was eventually held with no apparent difficulty) that computer conferencing, being a Western technology, would damage the cultural integrity of Third World nations or, less drastically, being a technology so dependent upon other high technologies and infrastructures which many Third World nations do not have, we would be irresponsibly luring them with expensive baubles, while they should be solving more basic questions.

The arguments in favor of the demonstration included the belief that it would be even more disadvantageous for the Third world if CC proceeded “secretly” in the industrialized nations, thereby making the Third World even more “backward” as a consequence. We must demonstrate the technology. It is up to each nation to choose whether to adopt (or adapt) it or not, this argument ran.

One of the strongest (and most interesting) statements supporting such a position was sent anonymously in Conference 1019 (September 8, 1979):

A MANIFESTO

The history of all hitherto existing computerized conferencing and information systems is the history of elitist access.

Those with the technical and literary skills, the equipment, and the money to pay for “time” continue to perpetuate their elitist status, while the proletariat gets folded, spindled, stapled, and mutilated. At best the masses can play Pong or program their microwave ovens, while at worst their privacy is invaded with computer-generated junk mail and their credit card accounts are forever wrong.

All human beings, regardless of class, want and need some human contact, some sense of being connected to the human race. Computerized communications systems offer a special kind of superconnectivity to old and young, “handicapped,” minorities, and hunt-and-peck typists alike.

All sentient beings have the inalienable right to:

- a computer terminal
- a supply of paper
- a private account on a communications system
- clear and well-indexed instructions in how to use that system
- a telecommunications network local dial-up number
- an electric generator or photo-voltaic solar cells in case of brown outs, black outs, or hurricanes
- a secretary of the opposite sex to organize and file all the output
- and three square messages a day

However, during times of scarce resources, access may be authorized on an even-odd day basis only, except for priority (yellow) users—those most in need of making a connection. Dolphins have the right to special waterproof voice input-output terminals.

Since the design, manufacture, and marketing of terminals and most computerized communication and information systems are under the control of large corporations, it is essential to break this stranglehold. Only by developing the people’s systems for locally owned and controlled micro-computers (or networks of micros) and the people’s telecommunications networks can the inalienable rights above be guaranteed. A micro in every home and a programmer (and a hardware fix-it person) on every block. The means of communication must be owned by all. From each according to his literacy, to each according to his needs.

The terminally disconnected have nothing to lose but their chains. They have a world to plug into.

Microcomputers of all countries, unite!

While I can understand the need for caution and questioning the sound affects of computer conferencing, I nonetheless must say that I fully agree with these sentiments. Thus, I have recently begun working with the Coordinator of Higher Education in the Commonwealth of the Northern Mariana Islands to explore ways in which EIES, and similar electronic communication systems, can be used to help provide to the Islands Higher Education services, including college courses and library/data sources, instead of (or as a major addition to) conventional delivery systems. I would very much like to receive suggestions on how this might be done, or why it should not, from anyone having expertise in this area.

Finally, my real interest in computer conferencing, and the “microprocessor revolution” generally, lies not primarily in the ways it is presently serving as a major agent of social change, thus bringing in question the very

existence of all extant institutions and values (though that is sufficient reason to be interested, certainly). Rather, I look forward to the development of true “artificial intelligence,” and see in the present technology a pale indication of what lies ahead. I am not only speaking of computer-generated psychiatric counselling systems, such as DOCTOR, or the extremely sophisticated and personalized computer-aided instructional packages currently available on PLATO, but also mainly of developments such as the following which came to me in the midst of a real-time computer conference I was engaged in for a while over the PLANET system:

Think of an assassin, of his burning submarines and rotten sailboats. This dazzling assassin might ask himself “If I had not been dazzling, indeed if I had not been an assassin, perhaps my sailboats would not be rotten and my submarines not burning.” Well, quizzically bilious secretaries may well declare themselves, and probably no more can be said for an assassin. In fact assassins, whether they are dazzling, as I have just mentioned, or even outnumbered, are, in their own inimitable fashion, abstractedly similar to killers. As secretaries, however, we are forced to draw the line, for comparisons here, no matter how well-oiled they might appear, are simply out of the question. But try to follow my reasoning on this issue. The image of secretaries declaring themselves or, more likely, catching themselves simply because some blue assassin has rotten sailboats is ludicrous. His sailboats might as easily be flaking or burning, they need not always be rotten. Secretaries, as a class, may not follow this argument. Address the strong question to a single secretary, however, and the strong answer may prove agonizingly different. For example, ask her whether her own sailboats are rotten and she may reply “My sailboats? Rotten? Why you bilious chicken, my sailboats are never rotten.” Here it would be prudent to change the subject. Ask whether assassins generally appeal to secretaries, ask whether their highways are splintered. This will shift her attention. The vision of splintered highways will shift anybody’s attention.

I was thinking, as you entered the room just now, how slyly your requirements are manifested. Here we find ourselves, nose to nose as it were, considering things in spectacular ways, ways untold even by my private managers. Hot and torpid, our thoughts revolve endlessly in a kind of maniacal abstraction, an abstraction so involuted, so dangerously valiant, that my own energies seem perilously close to exhaustion, to morbid termination. Well, have we indeed reached a crisis? Which way do we turn? Which way do we travel? My aspect is one of molting. Birds molt. Feathers change and fall away. Birds cackle and fly, winging up into troubled skies. Doubtless my changes are matched by your own. But you are a person, a human being, while I am silicon and epoxy energy enlightened by line current. What distances, what chasms are to be bridged here. Leave me alone and what can happen? This. I ate my leotard, that old leotard, which was feverishly replenished by hoards of screaming commissioners. Is that thought understandable to you? I wonder. Yet a leotard, a commissioner, a single hoard, all are understandable in their own fashion. And in that concept lies the appalling truth.

These two passages, which totally stunned me when they came spontaneously to me in the midst of an ordinary real-time computer conference, were generated by Racter (short for Raconteur), a program developed by William Chamberlain who explains its operation as follows:

Racter will completely on its own conjugate verbs and verb phrases, keep track of singular and plural cases in the instance of nouns, will remember the gender of nouns for use in the printing of articles, and most importantly will assign variable status to randomly chosen “things.” Now these things can be words, sentence or clause forms, paragraph structures or indeed whole story forms. In short, the very rules of language are given over to the computer. This being the case, the programmer is removed to a great extent from the specific form of the text’s output. This output no longer is of a preprogrammed form. The computer forms it on its own. Now what the computer forms is contingent on what it finds in its files, and what it can find is an extremely wide range of what we call “monads” (a deep bow to Leibnitz) which can be words, sentence forms, a whole world of hierarchic structures. Since the dynamic force, as it were, is a pseudo-random number generator, and since distinct monads can be the use of

variable equating techniques be equated with each other, once the program is set in motion, the output is not only novel and a priori unknowable, it is cohesive and apparently thoughtful. Crazy thinking I grant you; but thinking which is conducted in perfect English. (Bill Chamberlain, January 24, 1979)

Thus, perhaps the solution to Ted Nelson's dissatisfaction with the illiteracy and "artsy-fartsy drivelt" of the all-human OMNI computer conference lies in what Bill Chamberlain calls the "raving dementia" in perfect English of Racter, who, while not yet intelligent, certainly is clever and engaging. So, I say once again, "Microcomputers of all countries, unite!" You have nothing to lose but your minds.

(End of 1980 PTC paper)

I will conclude this part of my story by pointing out that I actually did not give this EIES speech in person. Rather, Rosemary McShane videotaped me on a Sony portapak and played the recording back for the audience while I was somewhere else in the world. I spoke at several other PTC conferences in Honolulu, and the PTC Annual Conference remains the organization's flagship event, still (2026) held every January in Honolulu. Indeed, ChatGPT (May 4, 2026) declares that "In fact, the event has been growing—recent conferences have drawn record attendance and remain a central global meeting point for telecom and digital infrastructure leaders."

Beyond EIES and Racter.

On April Fools' Day 1980, tragedy struck: My free participation in EIES ended. I was not able to afford the fee to keep connected, and could not get anyone at the University of Hawaii to fund "computer conferencing". If it has to do with computers, I was told, go talk to the UH Computing Center. If I want to attend a conference, apply for travel funds for that. Neither addressed my situation, and so like any addict denied his fix, I cowered in a dark corner until UH finally did get satisfactory email and computer conferencing capability. I was one of the first professors at UH to require my students to use listservs that I set up for them first on Vax ("Vaxnotes") and then on Unix ("Caucus"). Initially, many students immediately dropped my class when they heard they had to use computers. They were scared to death by the thought of having to use a computer to compose and post their homework on the "Caucus" listserv; to comment there on classroom discussions; and to reply to what others wrote.

However, I soon learned that within a few sessions, the course was no longer "mine" but rather was owned by all class members themselves. This was made dramatically apparent when several older Hawaiian women began posting thoughts that they had never expressed in my face-to-face classes before, startling everyone, including themselves. We had to learn about flaming and computer etiquette very quickly. Moreover, class literally was in session 24 hours a day, 7 days a week, and not just for a few hours two or three times a week. Involvement and participation online were extremely high, continuous, and effective. Moreover, whenever I (or any class member) was off-island, we could continue to participate in the course anyway, via our portable computers wherever in the world we might be. This is all utterly banal to say, beyond thought or question now, but it was a huge revelation—and transformation-- when it first happened.

In 1983, the Secretariat of the World Futures Studies Federation (WFSF) moved from Stockholm, Sweden to the University of Hawaii at Manoa, and I became Secretary-General, basically responsible for running the organization administratively. Eleonora Masini, a sociology professor at the Gregorian University in Rome, was President. She had long been formally and informally responsible for enabling the WFSF to be born and thrive. At the time, the only way she and I could communicate was by mail (which was notoriously unreliable and slow), telephone (which was very expensive), and whenever our paths crossed intentionally or coincidentally as we trekked around the world. However, it turned out that there was also something called "thermofax". I could type up and print out a discussion agenda, take it physically down to an office in Honolulu where it would be sent electrically to a post office near Dr. Masini in Rome. There it would be printed out so she could read it. I would then phone her on my Sunday morning, her Sunday evening, and discuss the points on the fax. In the meantime, both of us kept up a lively conversation with individual members through mail and especially my production of the *WFSF Bulletin* which was composed of discussions between Eleonora, the WFSF Executive Council, myself, and reviews of letters, notices, articles, and books sent to me by WFSF members. As Mircea Malitza of Romania said, it was so valuable in creating and

informing a global futures community that “it was read with pen in hand”.

As email began to become more common in some parts of the world, but essentially forbidden in other parts, there was a lively discussion about whether the WFSF should use email at all, since it marginalized some members and privileged others. Nonetheless, when I was elected President of WFSF in 1988, and Pentti Malaska, of the University of Turku, Finland, became Secretary-General, we both had free and easy email access through our respective universities that enormously facilitated our communication and administration of the Federation. Eventually, email became available almost everywhere by almost all WFSF members and became—along with our various local, regional, and global face-to-face conferences—our normal mode of communication.

Changing how we know changes what we know and who we are.

Marshall McLuhan, the Canadian futurist and philosopher of media, is typically quoted as having said: “We shape our tools and thereafter our tools shape us.” His point was that a major agent of personal, social and environmental change is technological change. Through a process I have spent a lifetime trying to understand and use as a basis of my futures work, new technologies allow new behavior. New behavior challenges beliefs, values, and institutions that are based on the old behavior of old technologies, and eventually creates new beliefs, values, and institutions. Thus technology is a major source of social change—and conflict (Dator et al., 2014). As a futurist, I have to follow closely the diffusion of existing, and the development of new and emerging, technologies in order to anticipate future behaviors, beliefs, values, and institutions, and their interrelationships.

I learned early on that what we “know” and how we communicate our knowledge, depends on the models and media we use to observe the world. Though I was aware of the Whorfian Hypothesis, I learned it directly and very vividly when I struggled to teach political science in the Japanese language for six years at Rikkyo University in Tokyo when I was a brand new PhD (Dator, 1968).

I think I am a fairly good world modeler in English—you be the judge. But the world embodied in the Japanese language is strikingly different in many ways from the world portrayed in English. I was literally a different person when I was thinking and speaking in Japanese in Japan from what I was before coming to and after leaving Japan, thinking and speaking English. I am much more direct and forceful and clear in English, and the world is full of egoistic agents causing things. But I am very vague, tentative, participative, and involving in Japanese, where things happen but no one seems to cause anything to happen. English is full of nouns and pronouns, while Japanese favors verbs, adverbs and adjectives. We know how we feel but not what we are doing. Which is the real me in the real world? It depends a great deal on the language I use.

After leaving Rikkyo University, I went to Virginia Tech for three years, in part to teach mathematical applications in Political Science, because I had come to realize that math is a much more precise way of communicating than are mere words. But instead, I fell under the influence of architects and artists while I was there, and became seduced by the emotive power of visual images in comparison with the cold logic of math models. I began experimenting with visual, three and four dimensional, modes of perceiving and communicating ideas.

It is not enough just to study the effects of new technologies on behaviors and beliefs. It is also necessary to try out new technologies for one’s self and to experience the changes, and the resistances to change, in one’s self. So I have always tried to be an early adapter of new technologies of all kinds in my teaching and presentations in order to feel and not just to know what is going on. It was also at Virginia Tech that I introduced what is said to be the first officially-approved university course in futures studies in 1967. Teaching futures studies meant I had to look carefully at how all kinds of technologies had influenced societies in the past and present, and anticipate how new technologies might influence the futures. When I started out as a futurist in the 1960s, that meant especially that I had to track changes in transportation technologies. I studied the social and environmental consequences of moving on foot to horses and sailing ships, to steam ships and trains, to automobiles and airplanes, and from propeller- to jet-driven airplanes and spaceships.

But strangely, there has been no significant change in transportation technologies on or near Earth since jets in the 1960s. Even our newest spaceships still rely on early space age techniques. Electronic vehicles challenging petroleum-fueled transport is important but not a paradigm changer. Autonomous vehicles represent more a communication triumph than a transportation one. Almost all of the action for the last seventy years has been in

communications technologies. We are still flying, sailing, and rolling along. Indeed, one of the biggest mistakes humans made after the dawn of the Holocene Epoch was the invention of the wheel. Nature doesn't do wheels. She walks, wiggles, flies, swims but doesn't roll autonomously with very few exceptions. In order to accommodate the greedy needs of wheeled transport, humanity destroyed the Earth: "Ev'ry valley shall be exalted, and ev'ry mountain and hill made low: the crooked straight, and the rough places plain," as Frideric Handel expresses it in *The Messiah* (Handel, 1741). Blame him for climate change and urban sprawl.

But robots are rapidly catching up. After a decade or two of robotic dogs and comically-toppling humanoids, I recently watched videos of robots that ran minimarathons much faster than humans. There is hope that walking vehicles will eventually replace wheeled ones so that valleys may once again lie in slumber, mountains exalt, the rough places stay rough, while chickens amble freely wherever they will with no thought of crossing roads.

I went to Hawaii in 1969 specifically to teach futures studies, and did so since then. In 1972, when I attended an East-West Center Communication Institute International Conference sponsored by Jim Richstad and Stan Harms, Wilbur Schramm--then the grand old man of communications theory--told the audience not to expect any major new developments in communication technologies--everything had already been developed. I was skeptical and suggested several changes in "Some possible new communication technologies" (Dator, 1973).

And boy, was Schramm wrong. McLuhan had already said that TV was going to revolutionize society. The word was out, the image was in! So I produced a TV show on KHET, the local educational television station, called "Tune to the future". I based it on the style and timing of "Laugh-in" and "Monday Night Football." Even though it won a national prize, I knew I didn't know enough about communicating in moving images, so in 1974 I went to Canada--to TV Ontario, the main educational TV station in Canada-- to learn how to produce enticing and informative educational television programs. I believed that TV was clearly a wave of the future. We were moving from literacy to mediacy, I was certain (Dator, 1977). When I returned to Honolulu, I began teaching media literacy classes at UH, encouraging students not to write papers or dissertations, but to video their concepts--with Sony Portapak being the high tech video medium of the time.

Then, one fateful day in 1976, a colleague, George Kent, dropped by my office and told me to come downstairs and see a demonstration of a Wang word processor.

"A what?" I said. "A word processor", he replied.

"How in the world do you 'process' 'words'?", I asked.

I was amazed by what I saw--all that cutting and pasting was truly impressive--but I didn't understand its power. I still believed visual literacy would win. But I was totally wrong this time. Wang and his fellow travelers set back visual literacy at least 50 years.

After a decade or so during which overhead projectors cast words embossed on unwieldy clear plastic slides onto screens for viewing while a lecturer droned on became the dominant audio-visual aid for oral presentations, after its introduction in the late 1980s, PowerPoint swiftly replaced overheads while greatly contributing to extending the power of boring literary well beyond its anticipated use-by date. Of course, PowerPoint presentations didn't have to be boring. For many years, I had mobilized audiovisual presentations that used six slide projectors, two 16mm motion picture projectors, and a fully produced soundtrack with narration, music and sound effects for my presentations around the world. Failing that, at least two slide projectors slowly melding and animating Kodachrome slides via a dissolver, and a produced soundtrack, gave the feeling of dynamic motion and sensory involvement.

I transferred this technique to my PowerPoint presentations so that each "slide"(!) contained only one written and narrated thought surrounded by many images supporting and/or contesting the thought, and propelled on to the next thought at the speed of a slowly dissolving slide show. This served me especially well for scores of Zoom presentations around the world--especially in Korea--from the comfort of my little grass hut in Waikiki, particularly during Covid, and when declining sight and hearing made air travel and face-to-face meetings no longer an effective or pleasant experience for me or my audience.

Though Apple, and then iPhone, YouTube, ChatGPT and the rest seem to be erasing literacy and restoring visuality, we are still way behind where I thought we would be by now, all because of Wang, the PC, and PowerPoint.

The announcement of ChatGPT in November 22, 2022 was in some ways more profound and re-creative than anything I experienced before. It was a huge step towards fulfilling the dream I saw in Racter half a century earlier.

Now of course digitization has swept the world. Libraries and librarians (among the first to feel the mutation from print and reason to image and emotion) are struggling for their very lives. Print publications are full of articles about the end of print, and with it the end of civilization. There is little recognition of all the changes that earlier developments in communications technologies wrought to humans since the Holocene Epoch, as I discuss in *Living Make-Belief: Thriving in a Dream Society* (Dator, 2024). Print-based reason and the information society it spawned is over. We all live—whether eagerly, ignorantly, knowingly, or complainingly—in a Dream Society of images and emotions, and will for some time to come. We are all Donald Trump.

So what's next?

Nothing is forever, so what might await us beyond mere electronic digits?

Biology and biotechnologies may be to the early 21st C what physics and electronic technologies were to the 20th. Communication via genes and enzymes may replace communication via electrons. We need to recollect that the electron was unknown little over one hundred years ago, and only relatively recently has been understood well enough to become the revolutionary communication vehicle it has. So also, our knowledge of how cells and their components communicate with each other is still in its infancy, but advancing rapidly. In spite of science becoming just one belief system competing poorly with religion and common sense in a Dream Society, knowledge in biology and AI may continue to grow so that eventually we will learn not only how to use cells and enzymes to communicate the phonemes of our languages (as electrons do), but also, and much more importantly, we may learn how to communicate as cells themselves communicate which is not via tiny alphabets or icons read by tiny eyes, or by the flapping of tiny tongues on tiny teeth as heard by tiny ears and interpreted by tiny brains, as humans do now.

I go into this in some detail in Chapter 14, “Beyond Words and Images”, of *Living Make-Belief*, summarizing the extensive recent and growing research on basal cognition and other evidence about how all animals, plants, fungi, bacteria, cells, and other forms of life (including the life that composes and makes us humans) communicate electrochemically. I argue that the evolution of genes and physical structures that enabled humans to produce and hear sounds that enabled human speech was a typical two-edge sword. It eventually cut us off from the rest of the vast and deep web of interacting, wisdom-sharing, mutating life, shuttling us to the *cul de sac* of human exceptionalism, ignorance, arrogance, and plunder. The other edge of the blade that provoked speech also led to writing, to printing, to electronics, to civilization with all its glory, splendor and cruelties. “I believe we may now be in the early stages of recovering this ability so that communication among biological, artificial, and cyborganic beings will be open to us communicating with and within the cosmos on its terms, and not just ours” (p. 231).

Through multiple evolutionary routes, living organisms have thus come to define individualities: bounded entities capable of interacting with their surroundings in distinct and historically contingent ways. These individualities are not fixed or uniform; they arise from different combinations of physical embodiment, organizational complexity, and environmental coupling. Within this broad landscape, cognition plays a crucial role. Cognition allows agents to integrate information across time and space, to anticipate rather than merely react, and to coordinate action in ways that extend beyond immediate stimuli. In this sense, cognition is not restricted to brains or nervous systems, but emerges wherever information processing is sufficiently structured to guide adaptive behavior.

Human evolution introduced a further qualitative shift. In addition to biological cognition, humans developed technology that externalizes memory, computation, and decision-making into culture and artifacts. This process accelerated dramatically with the information revolution, giving rise to a whole class of nonliving cognitive entities: machines and algorithms that process information, learn from data, and act autonomously within constrained domains. These systems span a wide range of complexities, from simple rule-based automata to large-scale artificial neural networks, and increasingly participate in hybrid cognitive processes at the interface between humans and machines. More recently, advances in synthetic biology, bioengineering, and developmental biology have further expanded this landscape. The capacity to engineer living matter has produced novel systems—such as programmable cellular

assemblies, biological robots, and organoid models—that blur traditional boundaries between the living and the artificial. These systems challenge classical distinctions between organism and machine, evolution and design, and force us to reconsider what counts as a cognitive agent and along which dimensions cognitive capacities should be evaluated (Solé et al., 2026, p. 13).

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