

Session on views of the future—Chairman's introduction—Opposing views

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INTRODUCTION

This session represents a "first of a kind" for a major computer conference. The session is devoted entirely to formal technological forecasting and assessment efforts dealing with the computer industry. Technological forecasting¹ as an autonomous discipline, with its own set of methodologies and techniques, is only about five years old. Of course, similar efforts have taken place over the years within the long range planning staffs of most technology-oriented companies and organizations. Furthermore, the intuitive judgment of recognized experts is a technological forecasting technique that has always been with us and has been well represented at these meetings by various panel presentations. What appears to be really new is a growing recognition of the need to examine potential futures systematically in order to assess a wide variety of concerns and potential consequences of technological development. The days of looking only for profit related effects seem to be passing into history. Because the scope of concern has significantly widened, with an accompanying increase in the complexity of the required analyses, new approaches to forecasting have been sought.

Several of these techniques are represented in the papers of this session (Delphi,² Scenario construction, Model Building, correlation analyses, and trend extrapolation). To a large extent the contributions are of interest not only for what they have to say on the future of computers and associated technology, but also for the manner in which they arrive at their observations.

The number of technological forecasting studies dealing with computers has increased considerably in recent years. Some of these are informative primarily in telling us how not to do forecasting. We have, in fact, reached the point where some of these are old enough so that a portion of their forecasts can be evaluated for their accuracy of prediction.³ It appears from observing these efforts that the considerations which give the forecaster the most difficulty are not the projections of the technology itself, but rather its potential applications and interactions with the rest of society. There is a primary flaw

underlying much of this earlier work, namely, an implicit tendency to view the computer field primarily as a driving force in society, while ignoring the impact of social, political, and economic forces on the computer field itself. Unfortunately, the rapid evolution of this technology, and the rate at which it has penetrated numerous segments of society, tends to reinforce this view subconsciously among those of us intimately involved in this area of endeavor. Therefore, as chairman of this session, I shall exercise my prerogative to offer the alternative view that the ultimate use of computer and communication technology will depend largely on factors outside the immediate scope of the field. To do this I offer two scenarios suggesting the use of computers in the 21st century.⁴

These scenarios are based upon the same projected basic information technology, but use it in opposing or contrasting manners. Each one rests on differing but plausible assumptions about resources and values of society in the 21st century. Together they provide a fundamental caveat for all the papers in this session by dramatizing the difficulties facing anyone attempting to forecast the future of information technology and its application.

These two scenarios represent what might be characterized as a plausible "open" society and "closed" society. They are not intended to portray the extremes of open society, which would be anarchy, or of closed society, which would be a slave state. Both scenarios are presented as selected day-to-day communications that an average citizen might receive via his computer terminal. Thus they do not provide an exhaustive description of the alternative societies, but rather convey to the reader a Gestalt—a feeling for what these alternatives might be like to live in.

Common assumptions for both scenarios

We assume that society in the year 2000 and thereafter can be characterized as "information rich." Essentially, all the information generated by society and needed for its operation exists in electronic form. The collection, processing, transmission, distribution, storage, and retrieval of information on a day-to-day basis takes place

* The views presented are those of the author and do not necessarily reflect official policy of the Office of Emergency Preparedness.

on a largely "self-generating and sustaining" basis. The information centers, the networks tying them together, and the procedures governing their use are sufficiently compatible that they may be viewed jointly as a single nationwide information complex largely transparent to the users and their applications—much as the telephone system is today. Terminals exist in every home, voice recognition is a common form of computer input, mass on-line storage is cheap and plentiful, and other similar marvels of technology (by today's standards) abound. Both scenarios, therefore, assume the continued advance of information technology along the directions now perceived. Barring a major holocaust, such evolution of the technology does not seem unreasonable. Of course, the implicit assumption that the industry has managed to agree by the year 2000 on standards for internal compatibility of a nationwide information complex is somewhat more questionable.

The "closed" information-rich society

It is assumed that by the year 2000 some evolutionary process has resulted in a scarcity of important material and human resources—energy, mineral ores, medical talent, etc. Society is characterized and regulated by various algorithmic and procedural models, operating on a real time basis and striving to maintain the precarious balance between supplies and demands. Government consists of a dictatorship by the system over which no one individual or group has an effective control. The various components of this system are largely the product of a reductionist philosophy and represent uncorrelated short term fixes to problems as they occur. The complexity of

the overall interaction of these individual fixes is not really well understood.

As resource limitations have become increasingly critical individual options of choice have been eliminated whenever there has been any suspicion that this would benefit the objective of survivability of society as a whole. The education process is correspondingly driven largely by the needs of society and provides rather narrow training. Information flow is regulated on a "need for" basis, strong pressures exist for conformance to a common "official" ideology or singular value set, and the system as a whole fosters a high degree of centralized control. However, an illusion of free choice is not only allowed to exist but even encouraged, and other types of escapism are provided via recreational pursuits.

The "open" information-rich society

It is assumed that through effective planning society has reached by the year 2000 a posture in which resources are relatively abundant with respect to societal and individual needs. Emphasis is placed on maximizing individual options of choice. Extensive understanding of adaptive and cybernetic approaches to solution of practical problems allows a high degree of decentralized controls, although centralized predictive capability is retained to detect and announce potential conflicts. As a result of this abundance, society is tolerant of a heterogeneous set of ideologies and a multiple value system flourishes. Distinctions among the functions of education, employment, and recreation have become blurred. Educational philosophy is holistic in nature, striving to prepare the citizen for a society which enjoys highly individualistic life styles but requires strongly participatory government.

EMPLOYMENT AND EDUCATION

Open

The package of information which you requested relative to career and educational choices for your son has been prepared and is now available for access at your leisure. The package includes educational requirements and potential income ranges for the careers you selected. In addition, several careers that are similar in income and educational requirements to those you selected have been included for your consideration. Also included in the package is a report showing how people with similar performance profiles to that of your son, now feel about the career they entered.

Your recent series of unsuccessful and unprofitable purchases in Phase XL of the Department Store Game indicates that you are not yet ready to commence participating in the Economic Market Policy Game, Phase A2. Upon successful implementation of the A2 buyer's strategy, you will be qualified as Assistant Buyer and eligible for employment at the Group Store, if you so choose.

I would like to exchange for one year my current job function as manager of distribution for a midwest appliance manufacturer for a job function in the sales area (at level B or above).

Closed

As a result of your son's performance this past educational cycle, he has been transferred to track three for preparation in employment class five.

Under your job classification you are entitled to attend one professional meeting this year. According to your schedule of assignments and available travel funds the MIS system has determined that for the meeting in March of the SOCIETY FOR FORTRAN 84 PROGRAMMERS is best suited to fulfill this privilege. It is further suggested that you attend the following sessions. . . .

Your recent series of unsuccessful and unprofitable purchases in Phase XL of the Department Store Game indicates non-orientation toward the merchandise manager's field. You are to report to the Group Store, as Stock Clerk, Class C, Malthusium Kit department.

A recent computer evaluation of your job performance exhibits a discrepancy with respect to the job's requirements. In order to avoid declassification, you must report for updating on. . . .

Open

Your request for educational opportunities has prompted us to bring to your attention the fact that Ecological Watchmen and Recycling Engineers are urgently needed. Many openings exist for this outdoor occupation, offering excellent wages and, currently, a one-to-one exchange program: for one year on the job, spend one year at any knowledge or recreation center of your choice, all expenses paid.

Openings are now available for robotic controllers in building construction. In view of your experience in this area, we would like to enter negotiations with you for a work period of six months.

Open

Your proposal submitted last week to our venture bid service for a new product in industry sector 83 has received six complete bids and eighteen partial bids for financial support. None of these, however, meet all your initial constraints on ownership and profit sharing parameters—a complete analysis of differences is attached including an estimated ten year profit flow analysis to you on the three most favorable bid combinations. Please advise should you wish to restate your constraints.

Your current offer for a house painter has had no responses the past week. Based on current market conditions we estimate only a .3 probability of response this month. A raise in your offer of 15 percent would increase the response probability to .95.

The paper you submitted last month has been reviewed. It appears that your paper not only has original content but it will allow us to retire from our immediate access files ten other papers to the offline archives. We are, therefore, adding your paper to our system immediately and we are informing users with appropriate interest profiles of its availability. Thank you very much for your contribution.

In addition to the material resulting from your particular search of our literature banks, the following four individuals have indicated they are seeking contact with individuals exhibiting your search pattern. This auxiliary service of your local knowledge center is intended to promote contact among individuals with common interests. It is your option to establish contact. However, if you wish your name added to the list, please notify us.

Your request of our news file has revealed that the information you desired has not yet been released by the appropriate agency. We have therefore entered a formal request for disclosure and established a reporting team to handle the matter. You will hear further within ten days.

Closed

As of... you have been awarded a new job with the Government Employment Corporation. This opportunity to serve your government, of course, carries with it certain sacrifices in dwelling area and salary cash flow; however, be assured that the data banks have your file in the active list and will do all that is possible to reinstate you in private enterprise at some time in the future. Your current employer has requested that you be notified that a suitable transfer bonus will be applied to your account upon proper training by you of the replacement for your current job function.

SERVICES

Closed

A recent survey by this office has resulted in your being chosen for a formal exchange of views with the "PRIME MONITOR." Any licensed barber shop may perform for you the hair shaving necessary for electrode placement.

Your recent behavior at the community meeting of June 15 seems to deviate from your filed psychological profile. Please report for a reexamination on...

As a regular service we offer at bargain rates a monthly list of "suspicious" word combinations used by the government computerized monitoring systems to select written or verbal communications for review by the Office of Internal Stability. If you wish to avoid observation for potential deviant behavior, our service is a must.

Our agency stands ready to provide you with the data requested and to which you are entitled. However, since this data is computerized, we cannot predict the actual cost to you of providing this information. It is, therefore, necessary that you post a payment bond in the amount of... before we undertake to process your request. In addition, your request is not sufficiently detailed and a new request certified by an information engineer must be submitted.

A computer analysis of your professional writings indicates that you have been writing on subjects outside your rated discipline. Your current rating within your current field will be lowered unless this situation is corrected. You are of course free to apply for change of discipline area and the appropriate forms and schedules of governing review hearings may be obtained from...

An analysis of your request of our news service shows your background profile provides no justification for supporting your need for this information. A check on this analysis by the government agency responsible for this information further confirms this result. Therefore, in order to conserve resources, your request is denied. You are, of course, free to seek modifications of your profile.

LEISURE

Open

Your requirements for a vacation house for three months have been matched against housing available location and other features of homes that appear to meet your specifications. If you wish to negotiate detailed arrangements, please let us know. If you wish to make your own home available during the time you are on vacation, please indicate this on our next communication.

We offer a complete line of "recreational," "educational," and "experience" vacations. Our information service and planning system offers comprehensive data on the environment and facilities of all vacation centers in the southwest, including the scope of available knowledge banks and communication and processing capabilities. Depending on the type of facility you choose, our knowledge banks can offer a wide variety of games, courses on many topics and dreams in many emotional variations. Our analysis routines will provide complete simulated alternatives to meet your specifications.

Mr. Norjk of Norway and his family will be in your city during the month of July. Our examination of your active hosting record in our files indicates a strong compatibility of interests for your two families (analysis enclosed). With your permission, we will pass this information on to them.

We regret to inform you that our home game service does not currently offer group simulations of primitive societies for youngsters. We will, however, poll the families using our service and establish if there is sufficient interest to modify one of the adult games in this area.

The Boston Fine Arts Museum offers the recorded experiences of creating over four hundred works of the finest art of the day. Learn the techniques of many fine artists by reliving their emotions and actions in the creative process. Our staff metric-psychologist is available for consulting in avoiding the psycho shock possible from merging disjoint personality traits of you and the artists of your choice. Be sure also not to neglect our recent acquisition in the performing arts—conductors, dancers, actors and singers.

Open

To: K. Midas

The XYZ Institute for Tax Assistance is happy to inform you that a tax rebate of 313,000 credits is due to you on your 1989 income. This amount includes a .06 percent remonstrative penalty levied on the Federal Tax Bureau for its error, plus an added 7.40 percent compensating interest to compensate you for non-use of the credits in the intervening years. As your neighborhood Tax Assistance Center, we are ready to help you in any other tax matter. Please call on us.

Your application for free control of your automobile on public metroconnectors has been denied. Your tested reaction timing is not sufficient to ensure adequate safety

Closed

You can rest assured that our travel service provides a full range of vacation plans matched to your travel, food, and energy allowances. Do not hesitate to call. . . .

We are very pleased to inform you that your eighth preference choice for a vacation has been approved this year.

We are happy to announce that we were able to obtain accommodations for you at the Mountain hideaway resort. Accommodations for your wife and child were found at the Cliffside resort, a mere twenty miles away.

Our robotic sports areas offer participation in a wide variety of robotic combats. Duel to the point of robotic destruction with your own wide choice of weapons—swords, tridents, mace, clubs of all shapes and sizes just to mention a few. Duels arranged to match your skills to those of your opponent's included in the standard fee. At slightly higher rates you may challenge the current champion in various weapon classes. Also, two mass battles offered each day and special training sessions for beginners.

The apex dream parlor offers over one hundred in the latest drug-electronic stimulated dreams. Our three most popular dreams this week are:

- (1) Own your own small business for a day—take full responsibility for all decisions—be your own boss.
- (2) A day on the beach—enjoy unpolluted waters and clear white sand, feel the warmth of the sunlight through a crystal clear atmosphere.
- (3) Have a creative idea—create and document a new idea, present it orally to a peer group and receive renown and acclaim.

GOVERNMENT

Closed

To: K. Midas, Sr.

The Federal Bureau of Tax Analysis hereby informs you that a tax rebate of 288,000 credits is due to you on your 1989 income. The Bureau assures you that its evaluation of your 1989 tax return is now complete and correct.

To: K. Midas, Sr.

The Federal Bureau of Census has noted that you received an added income of 288,000 credits during FY 1989 which was not reported on the census form. Accounting Department has therefore computed the required federal, region, state, county, city, block, head, automobile, and penalty taxes on this unexpected amount. A copy of your tax bill is herewith enclosed for

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margins for the integrity of all travelers. However, it is noted that your test results show a high probability that a standard course of training in Judo or tennis or a similar sport would probably increase your reaction rate to the point of satisfying our standards.

This is an official notice under local ordinance 817 that a set of computerized caucus conferences reflecting pro, con, neutral, and alternative positions has been established to examine a rezoning bid that is pending in your area. As a local property owner, you may join any of these conferences at no cost.

We are required by law to notify you once a month of any outstanding communications you have not accepted for delivery. These now include 118 advertisements, 16 governmental notices, and 13 personal correspondences. Of the latter, one is classified as pertaining to an in-progress contract arrangement which you must act on by July 13 or suffer unnecessary financial loss to your credit account due to contract penalties to be awarded the other party.

Following is your yearly tax analysis provided by IRS to each citizen based upon all automatically reported data pertaining to your tax account. This computerized analysis attempts to indicate your lowest possible tax liability; however, it is possible in unusual circumstances for this to not occur. You may therefore dial our local analysis service to attempt further optimization. Please notify us when filing of any apparent errors in the data pertaining to your account and supplied by other services.

Open

To: Dr. O. Mark Hyman

After reviewing the diagnosis of the patient you submitted to the neurological consulting network, a number of us at the Berkeley bio-engineering laboratory feel that a motor nerve hypors system we have recently developed may allow your patient normal use of his right arm and hand. Please notify us if you wish full specifications for implantation of this system.

Your requested analysis of your health records and correlation to current test data indicate a need for at least a twenty pound weight reduction under a supervised program, if you are to avoid a future heart problem. Please contact your physician at your earliest convenience. Thank you for using our automated diagnostic booth.

Thank you for calling on our community information service. In answer to your request, following is a list of medical personnel and clinics in your area with an assessment of specialties, performance histories, and fees for each.

For a slight additional fee our computerized dating service offers an auxiliary matching procedure based on a complete genetic analysis of both parties.

Closed

the amount of 373,000 credits, which will be deducted from your purchasing account today. A copy of this message has been sent to your employer and to your regional fiscal therapy center.

Your request to move to another dwelling area must be submitted to the office of housing permits with copies for approval to the departments of energy management, transportation, tax assessments, environmental monitoring, societal impacts, and financial control. Upon reply by these federal offices you may proceed to seek concurrence from appropriate government offices.

You are hereby notified that per Public Law 813, you must vacate your dwelling unit within one month of retirement in order to maintain equitable transportation patterns. Your new classification will allow you to seek a living unit in the following areas . . .

Your violation of allowed energy consumption this month has resulted in an automatic fine of . . . due to the inability of your cash flow account to meet this deduction a proportion of your salary has been attached for . . .

It has come to the attention of the Economic Growth Office that your cash flow account is in excess of allowed positive limits. If you do not establish a higher purchase rate by June 5, we will be forced to impose a personalized tax on this account.

MEDICAL*Closed*

To: Dr. O. Mark Hyman

An examination of the neurological condition of your patient's arm and an evaluation of his job function shows too low a benefit/cost ratio to warrant further corrective treatment. You are hereby instructed to terminate further effort on this case and revise your allocation of resources accordingly.

Your computerized diagnosis does not provide you with a high enough priority to see a doctor at this time. Your appointment has been scheduled for next Thursday at 10:00 A.M. Your probability of survival to that time is estimated at 68 percent; the current immediate appointment threshold is 57 percent. Do not hesitate to dial us again should you feel a deterioration in your condition.

Due to genetic mismatching your application for breeding with Ms. . . . has been denied; however, we offer the following list of egg or sperm alternatives with which the two of you may seek to form a family unit.

Enclosed is a list of local discussion groups which our analysis shows have a high potential of aiding you in resolving your current concerns. You may join these physically or via remote terminal hookup on either an anonymous or non-anonymous basis. Do not hesitate to call on us for any further mental health service you may wish.

REFERENCES

1. Mitroff, I., Turoff, M., "Technological Forecasting and Assessment," *IEEE Spectrum Magazine*, March 1973.
2. Linstone, H., Turoff, M., (eds) *Delphi and Its Application*, American Elsevier, late 1973. Turoff, M., "Delphi and Its Potential Impact on Information Systems," *AFIPS Conference Proceedings*, Vol. 39, 1971.
3. Grabble, E. M., Pyke, I. L., "An Evaluation of the Forecasting of Information Processing Technology and Applications," *Journal of Technological Forecasting and Social Change*, Vol. 4, No. 7, 1972.
4. A large part of the material in these scenarios was developed by the working group on the Assessment of Information Technology at the

This is to notify you that Mr. Jung located at unit 437 in your living complex is under treatment for MDN (Mental Deflections from the Norm). It is your civil duty to report all interactions with this individual and observations of interactions between Mr. Jung and others. Your aid in this matter will insure that the treatment will be brought to a speedy and successful conclusion.

NATO Advanced Study Institute on Information Science in August of 1972. The members of this group were: Shuhei Aida, Issac Auerbach, Dennis Conrady, Lee Friedman, Carl Hammer, John Martell, Gil Puente, Alex Strasser, and Murray Turoff. The full report of this group will be available in Vol. 1 of *Challenges to the Development of a Science of Information* to be published in 1973 by Marcel Dekker, Inc.

5. More elaboration on the "closed" society may be found in "Meeting of the Council on Cybernetic Stability—A Scenario by M. Turoff," *Journal of Technological Forecasting and Social Change*, Vol. 4, No. 2, 1972.