JHB 18-JUN-75 19:18 32783

Response to 26007 on 32695 -- Viewgraphs for TNLS Instruction

1 I also think the viewgraphs are an excellent idea. I suggest we meet Thurs, 26 June, when Jeanne and Susan will be back. How about 10:30?
pooh's idea to use the revised preface charts as viewgraphs sounds good. That is just one of many very good things being produced by Dirk's group -- we plan to use as much as we can support and that is relevant.
At this point I am not sure about the use of any command matrices. We made one available for years, and I never saw it referenced or found it helpful in my training, particularly of basic users where it tended to be confusing. But perhaps one that is much more simple.... 1

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Response to 26007 on 32695 -- Viewgraphs for TNLS Instruction

(J32783) 18-JUN-75 19:18;;;; Title: Author(s): James H. Bair/JHB; Distribution: /SGR([ACTION] I really need to see the actual layout -- a draft would be fine) POOH([ACTION]) JMB([ACTION]) DVN([ACTION]) BEV([ACTION]) KIRK([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: JHB;

FUTURE OPPORTUNITIES IN TELECOMMUNICATIONS

Lawrence H. Day

Paper Presented at the World Future
Society Second General Assembly
June 4, 1975
Bell Canada

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Introduction

5a The purpose of this paper is to outline several areas where the future use of existing and new telecommunications services is going to have a significant impact on society in the next two decades. The limitations of a short paper such as this force the discussion to be superficial in nature and reduced to a review of only the most obvious impacts. (1) The emphasis is on the societal benefits rather than the business opportunities that will exist in these areas. The complex questions in the legal, regulatory, and competitive impacts will also be ignored here even though it is recognized that they will have a major impact on how and who delivers many of the services that will provide the benefits discussed. Similarly, the important area of detailed cost/benefit calculations will be left for other analyses.

5b The paper begins with a brief overview of the author's definitions of several key terms. This introductory overview is completed with a short review of some of the telecommunications service areas that will provide the technological thrust for the applications discussed. The first impact area is that of the potential of future substitution of certain travel activities by telecommunications and the impacts that may result from that process. The emphasis here will be on the energy and environmental implications of this substitution process. The next impact area reviewed is in the area of productivity improvement. This will be a key concern with the continuing economic crises of inflation, unemployment, international discontinuities in trade, and resource shortages. The third opportunity is in the field of the delivery of medical services. Various telemedicine capabilities may enable the delivery of health care on a more widescale and equitable basis in the future. Finally, the implications of telecommunications systems on the international transfer of knowledge and technology will be reviewed.

5c The paper will, in many cases, draw upon the research of the author's Business Planning Group in Bell Canada. (2) This is a long term technological forecasting and assessment organization operating in the Headquarters of Bell in Montreal, Quebec. This group has conducted numerous studies over the past decade in attempting to determine future courses and impacts of

telecommunications systems. Where possible, references will be given to the source of particular forecasts or impact analyses. 5c

5d Definitions 5d

5e A brief review of the technological section of this paper reveals that the working definition of the term "telecommunications" is a broad one. This working definition states that telecommunications consists of all means to impart information at a distance through the transmission of electromagnetic wave symbols. (3) The emphasis on assessing the future impacts of telecommunications systems is the prime reason for choosing an all-inclusive definition. We are not interested in trying to draw a legal or regulatory line between computer and communications systems, even though that is an important distinction for some purposes. We are also not concerned with attempting to define a technical distinction between computer and communications systems. The impact of telecommunications systems in the future will be the combined result of the uses of the computer and communications segments of modern teleprocessing systems. Any attempt to separate the roots of most of the impacts of these systems would be an academic exercise. 5e

5f This definition does exclude broadcast radio and television communications. These are one-way systems with broadly defined audiences. Telecommunications systems are directed towards transmitting information between specified audiences, and two-way interaction is expected. 5f

5g Technological Issues 5g

5h The telecommunications technologies that will create the opportunities for social benefits in the next two decades are reviewed below. This is only a cursory overview of some of the key thrusts in technological and service development. The references shown in the footnotes will lead the interested reader to more detailed examinations of each of the systems that are examined. 5h

5i Two-way Broadband Systems (4) 5i

5j Most of the literature in this field has been concerned with an expansion of the capabilities offered by co-axial cable currently being used to deliver cable TV signals. These broadband channels can be converted to interactive applications through the use of additional electronics to provide low speed (audio grade) or broadband (video grade) return paths from the receiving location to the central distribution point (the "head end"). These return path capabilities can also be provided through the use of the regular telephone network. The significance of these systems is

that they create the ability to deliver "on demand" selective visual information over the broadband channels. These systems have the theoretical capability over time to add random switching so that each subscriber can call any other subscriber in a fashion similar to telephone calls today. These calls could be audio, audio-graphic, or audiovisual in nature. It is still questionable whether the providers of cable systems will invest the additional capital required to provide these types of capabilities. The recent financial difficulties in the cable TV industry have strengthened the view that widespread use of interactive television into the home is further off than many have predicted in the past few years. 5j

5k The availability of a host of consumer-oriented capabilities has been forecasted by those expecting the development of a "wired city" (a misnomer since most cities are already wired for power and telephone systems). These services include: 5k

5k1 remote shopping 5k1

5k2 remote banking 5k2

5k3 electronic security services 5k3

5k4 electronic education 5k4

5k5 electronic voting 5k5

5k6 consumer information retrieval systems 5k6

5k7 remote medical systems 5k7

5l Visual Telecommunications Technologies 5l

5m The development of visual telecommunications services is taking place on many fronts. Interpersonal visual communications can take the form of randomly switched calls between individuals using a technology such as the US Bell System's PICTUREPHONE . Interpersonal visual communications can also take the form of point-to-point teleconferences between groups of individuals using studio-based systems such as CONFRAVISION in the UK or Bell Canada's CONFERENCE IV system. The CONFRAVISION system has recently been extended to Sweden, and other European countries are reported to be planning to join this growing network. In the US, the Bell System has introduced a three city (Washington, New York, and Chicago) conference television based upon PICTUREPHONE technology. The Australian Post Office has also been using a CONFRAVISION system for several years. 5m

5n The systems discussed above are all directed toward inter-city communication. The question of intra-city video conferencing has also been tested but not on such a widescale basis. The Metropolitan Regional Council in the New York City area has been using a multiple location video conference network for local use during the past several years. This system has been used in the New York City area for electronic meetings between the local politicans, civil servants, and for remote training sessions. (5) Interactive television systems (audio return paths only) have been used at Stanford University and The University of Southern California for several years to reduce student travel to classes or provide educational training to employees right at their remote job locations. Both inter- and intra-city systems offer the ability to interact with images of speakers at remote locations and to share pictures, diagrams, and graphics. 5n

5o Communications Satellites 5o

5p Communications satellites have grown from experimental vehicles to key components of national and international communications systems in the past decade (both for broadcast and interpersonal communications). Canada was the first country in the world to use synchronous orbit domestic satellites for broadcast and interpersonal communications within a nation. While there are abundant east-west communications systems within Canada, the satellite permits communications into the far north of Canada where other systems could only provide delayed broadcast or periodic telephone service. This technology is viewed as an important means of linking residents of the North into the communications mainstream of Canadian life. In the US, domestic satellite service has recently been introduced by the Western Union Company. This system will also provide nation wide telecommunications service to both end users and other common carriers. 5p

5q Information Storage and Retrieval Systems 5q

5r Communications technologies in themselves are not the only technologies that will have an impact upon society. The complex merging of computer power and communications systems is leading to a whole new order of significant technologies. The development of "on-line" (ie communications linked) time sharing systems that provide a host of personalized information storage and retrieval capabilities, text editing, and computational power is creating the possibility of utilizing remote work centers with the required access to computer systems needed to accomplish a task. Developers of very advanced, but user-oriented (the "dumb" user from a computer viewpoint) systems see them as creating "augmented knowledge workers" over time. (6) They foresee an evolution in

work styles and capabilities as knowledge or post-industrial workers utilize the power in these systems. This could have considerable impact upon future patterns of social interaction since these systems can be routinely accessed from any location that has a telephone. (7) 5r

5s Computer networks 5s

5t The evolution of several advanced forms of computer networks in North America will reinforce the tendencies outlined in the above section. Linking through relatively inexpensive communications networks permits specialization of computer capabilities at various geographic locations. The Advanced Research Projects Agency (ARPA) has financed the development of one such system in the USA which is now being extended (via satellite) to Europe, Hawaii, and the Far East. (8) This "resource sharing" of specialized computer systems will assist in further augmentation of knowledge workers . Several commercial versions of these forms of computer networks are being introduced in the US. The Trans-Canada Telephone System is also introducing a common user packet switched data network in the next year. Plans for similar experimental networks have been also announced by most European telecommunications authorities and by the Japanese telecommunications organization. 5t

5u Computer-Augmented Conferencing (CAC) 5u

5v CAC connects a number of individuals with computer terminals to the computer in a synchronous or asynchronous mode, permitting them to approximate the interactions that they might experience if they were engaged in face-to-face communication as well as providing new capabilities not currently available with face-to-face or electronic communications. The number of participants in a computer-augmented conference can vary from two to as many as twenty or more. Since the communications process is asynchronous, many conferees can input their comments to the conference at the same time; when they have finished inputting, the computer delivers the messages that have arrived during the input phase. A text editing facility may also be included in the CAC package. (9) 5v

5w Other Technologies 5w

5X This analysis of the technological issues that are stimulating interest in the future of telecommunications is only a brief overview of the possibilities that are emerging. Each of the technologies discussed above can be explored in much greater detail in the various references given. Many other relevant technologies which will have a bearing on the future have not

been discussed. These include: intelligent terminals, video discs and cassettes, audio cassettes, video data banks, audio data banks, computer based education systems, facsimile transmission, graphic communications, still frame TV transmission, artificial intelligence systems, and voice input to computers. The main purpose of this section of the paper was not to be all-inclusive, or to review any particular technology in detail, but to give a flavor of the trends that are currently underway 5x

6 Travel/Communications Substitution: Energy and Environmental Impacts (10) 6

6a The potential of future communications based systems to stimulate some form of substitution for travel is a frequent subject of discussions of the future environment. Most forecasts seem to lie at each end of a spectrum of possible analyses. At one end there are broad generalized scenarios optimistically postulating many forms of substitution of local and intercity travel through the use of a host of computer/communications services. The links between today and the future are not usually detailed and we are left with considerable uncertainty as to how this future communications based society evolved. The economic, social, and political benefits or potential negative impacts of this substitution process are also not examined in any detail. At the other extreme there are very specific studies of how specific technologies may augment the substitution process for individuals working at certain institutions with defined travel patterns. Between these two poles there is a considerable knowledge and research gap. Several projects underway at Bell Canada and in other institutions are designed to help fill this knowledge gap. While many of the activities described here are Canadian or American, the author recognizes that parallel activities are also underway in Europe and Japan. 6a

6b The question of substitution may be regarded as generic in the case of a macro-analysis. However, our futures research and that of others has indicated that the subject should be examined on two levels of substitution: inter-urban and intra-urban. Inter-urban substitution refers to the process of replacing certain types of intercity travel with communications and computer based services. This travel is usually that of businessmen, government officials, or educators for defined occupational purposes. Intra-urban substitution refers to the process of replacing a wide variety of activities within an urban area with a large number of electronic services. These forecasts usually include replacing daily commuting to work with "electronic offices" in the home or in neighborhood work centres. Electronic education, security, banking, shopping, voting, and consumer information retrieval services are also envisioned within the urban area in order to

reduce the need to travel for many routine activities. Much of the research and speculation in this area is found in the "wired city" or interactive broadband systems literature. 6b

6c The phrase "substitution" is used here as a shorthand expression that refers to very complex, mostly unknown (to date), relationships between the transportation and communications sectors of our society. This relationship is not new, of course, as these two sectors have been intertwined in a maze of relationships since the development of postal, telegraph, and telephone services. Research on the impacts of these old communications services upon personal travel has been extremely limited to date. The simultaneous rapid growth in the use of modern communications and transportations systems during the last few decades in North America has masked the development of interrelationships between these two sectors. Studies have indicated that those who travel a great deal also use communications systems frequently. Thus, existing communications and transportation systems appear to be mutually re-inforcing. However, many argue that the rapid proliferation of new communications technologies when combined with the current crises, congestion, and negative side-effects of many transportations systems will lead to a new era of substitution. 6c

6d Neither should the phrase substitution be interpreted too narrowly in terms of face-to-face personal contacts. (11) While certain existing face-to-face contacts may be replaced in the future with new technologies, new forms of communications systems may create the ability to undertake activities that are impossible today with face-to-face contacts or existing technologies. Thus, substitution processes may, in fact, serve latent needs that have not been served up to now. 6d

6e The question of travel/communications substitution is not just a point of academic theory. Many recent studies have concentrated upon this impact area. For example, a recent survey of 9600 business travellers , who were surveyed while in the act of travel, found that 20% of them were willing to substitute the existing trip they were on with various types of telecommunications alternatives. The details of this study, conducted by the Business Planning Group of Bell Canada, are reported elsewhere. (12) The overall finding is recounted here to stress the point that the concept of substitution is viable today in the minds of many business travellers and can be expected to grow in the future. 6e

6f There are a host of inter-relationships and impacts associated with the substitution process. These range from the cost-benefit trade offs that may accrue to the substitutor through to the

impacts on family life styles and corporate patterns of decision making. The author has discussed these elsewhere and will not repeat them here. As noted in the Introduction, the prime focus in this paper is on the societal impacts that may accrue through the use of telecommunications systems. The prime impacts here are in the energy and environmental areas. 6i

6g There are many environmental and energy issues related to travel and transportation systems. These have become increasingly important in public and private policy determination in the past decade. One forecast is that these factors may lead governments to promote or encourage communicating rather than travelling in the future. This could be through a wide variety of administrative mechanisms, including ones that may alter the economic cost/benefit ratio in favor of communications alternatives. 6g

6h The environmental costs associated with transportation systems have become identified in considerable detail in the past decade. Current research is expanding information on these issues at a rapid pace. The environmental considerations associated with communications systems are virtually unknown, although recent interest has been expressed on the subject. Analysis that has been undertaken to date leads us to believe that these costs are far less on a per capita user basis than those for transportation systems. (13) 6h

6i Any comprehensive analysis of the environmental costs associated with travel and communications systems must go beyond an examination of operational costs of visible structures. The costs of construction of the physical plant required to provide these services should also be included. The environmental costs associated with maintaining the required infrastructures are required as well. 6i

6j The phrase "environmental costs" has been used to refer to a wide variety of issues. The list below is not exclusive but it gives an indication of the types of environmental costs that are associated with the use of transportation and communications systems. These factors will have to be added to the economic and behavioral ones in order to provide an adequate analysis of the overall question of inter-urban and intra-urban substitution: 6j

6j1 a) energy consumption of transportation or communications systems (increasingly important with the North American and European "energy crisis"). 6j1

6j2 b) energy consumption required to construct, operate, and maintain the manufacturing plant, and industry infrastructures for both sectors. 6j2

6j3 c) resource consumption for construction, operation and maintenance of the required infrastructures. 6j3

6j4 d) pollution factors associated with the two industries, eg, air, water, radiation, noise, thermal, and visual pollution. 6j4

6j5 e) damage to ecological systems. (14) 6j5

6K As noted above, the energy implications of transportation systems are relatively well known. The Business Planning Group has reviewed the literature in this area and recently published a report on the Canadian view of the energy implications of passenger transport systems. This report fills in one half of the equation in our attempt to quantify the overall energy impacts of travel/communications substitution. 6K

6l The basic findings of our research indicate that the transportation sector of the economy accounts for 24% of the total energy consumed in Canada. The passenger sector accounts for 60% of that energy consumption. Over 90% of all Canadian passenger miles are accounted for by motor vehicle and air transport. Both of these forms of transportation are very energy inefficient. The importance of examining the business sector of passenger travel, as in the Business Planning survey, is shown by the fact that 25% of all passenger travel is for business purposes (60% of all air travel is for business reasons). (15) The influence of the transportation sector on total national energy consumption levels indicates the possibilities for energy conservation through reduction of some forms of travel by communicatons substitution. 6l

6m The task ahead is to identify the energy impacts of communications systems use. Research interest in this area has been growing rapidly. The "energy crisis" has led to many comments in the general and specialized press on the potential for some form of energy conservation through travel/communications substitution. Peter Goldmark , former President of CBS labs, recently stated that if we "eliminated commuting over 10 miles, I have calculated that we could save half our current consumption of gasoline while generating only negligible amounts of pollution". (16) He also goes on to argue that creating a "New Rural Society" (use of the technologies described above to reduce business travel and commuting to work) would reduce the need for expanding large cities and would also reduce the energy required to support their centralized infrastructures- air conditioning, heating, lighting, elevators, etc. (17) Goldmark's calculations , and those of all of the research in this field currently, are rough but they indicate the order of magnitude of the potential savings. 6m

6n Another macro analysis has been undertaken by the Office of Telecommunications in the U.S. Department of Commerce. They forecast that a 18% reduction in various categories of travel would result in a 5% reduction in U.S. gasoline consumption. (18) The travel substitution estimates certainly appear reasonable when the potential propensity for substitution determined in the Bell Canada survey is recalled. 6n

6o These overview calculations give a perspective of the global implications of large scale travel/communications substitution. Several studies have tried to examine this from the opposite perspective: the impact of substitution for specific trips using defined technologies. One of these studies has been undertaken by the Communications Studies Group (CSG) of University College London and the London School of Economics in conjunction with their work for the U.K. Post Office. (19) 6o

6p The CSG approach is to calculate the energy consumed in particular journeys using various forms of transportation. This requires estimates of the number of people travelling to a meeting which is a key variable for the transportation/energy consumption calculations. One of the difficulties in this form of estimate is that the number of people at one location for a teleconference is not a cost or energy consumption variable. The incremental cost of adding people on to an audio or video teleconference is virtually zero and hence, additional people may attend a teleconference more cheaply than in person. On the other hand, the length of a meeting within a reasonable period (eg., 1 day) is a key variable for the energy consumption of telecommunications alternatives and a fixed cost item for transportation systems. 6p

6q The CSG researchers considered their own survey's of the behavioral propensity to substitute, and developed an estimate on the potential overall energy savings on the London to Glasgow route. Their assumptions include a mix of audio and video teleconferencing and a conservative estimate of the level of substitution. They estimate that 20% of the energy presently used for business travel on that corridor could be saved through substitution (1.1 x 10-8 Kwh). (16) 6q

6r Similar calculations have been made by Dickson and Bowers in their preliminary technology assessment of the Video Telephone conducted at Cornell University.(21) Dickson calculated that an 8 hour teleconference between Los Angeles and New York was 8 times as energy efficient as a return personal trip using a Boeing 747. 6r

6s While energy issues are important, there are other environmental issues that should be considered in the travel/communications equation. Pollution is certainly one of

these factors. Van Vleck points out that the transportation sector produces 75% of the carbon monoxide, 56% of the hydrocarbons, and 52% of the nitrogen oxide pollutants. (22) These side-effects of travel must be shared by all in our society, not only those who travel. 6s

6t The question of resource consumption has also become more widely understood as planners and decision makers become more aware that we have a finite stock of non-renewable resources and that the demand is outstripping the replacement of renewable resources. The transportation sector is an important consumer of many of these resource elements. Recycling will have to become more prevalent in the transportation industry in order to preserve material resources. Substitution is another means of conserving resource depletion. Again , we do not yet have material consumption patterns available for telecommunications but we do have some idea of the facts for the transportation sector. The US transportation industry consumes 75% of the nation's rubber, 53% of its lead, 40% of its zinc, 29% of its steel, and 19% of its copper. (23) Further research is required to determine the communications industry's consumption patterns and the elasticity of the resource trade-offs between the transportation and telecommunications industries. 6t

6u The energy, pollution, and material elements of the substitution equation are certainly incomplete at this time. We can obtain an idea of the relative impact of various trade-offs through the preparation of scenarios assuming levels of substitution. As the next two decades unfold we can expect significant increases in travel communications substitution on both an intra and inter-urban basis. This will result from millions of individual and institutional decisions as well as from pressures exerted by governmental bodies. This pressure will increase as our knowledge of the societal benefits that result from the tradeoffs increases. The primary impacts of this process will be energy sevings and a reduction in the rapidly expanding environmental and resource utilization costs imposed upon society through travel and transportation. 6u

7 Telecommunications and Productivity 7

7a The issue of productivity improvement in domestic economies is one of long standing concern. Productivity is basically the act of getting more output from the same or lessor amounts of inputs. Productivity improvements are often gained by investing more capital in equipment or technologies which enable the workers to produce more, even though the cost of labor itself is a continuingly rising one. Productivity is also a concept that is usually identified with the production of goods. More and more

this is an outmoded concpt as the North American economy becomes a service economy and it moves toward the "post-industrial society". 7a

7b The basic concept of the post-industrial society was developed by Daniel Bell, a noted U.S. sociologist and futurist. Bell is also the chairman of the Commission on the Year 2000 of the American Academy of Arts and Sciences. He has recently written a book which explores the scope of this concept: The Coming of Post-Industrial Society: A Venture in Social Forecasting. In that book Bell outlines five dimensions of this concept: 7b

7b1 "1. Economic sector: the change from a goods-producing to a service economy; 7b1

7b2 2. Occupational distribution: the pre-eminence of the professional and technical class; 7b2

7b3 3. Axial principle: the centrality of theoretical knowledge as the source of innovation and policy formulation for the society; 7b3

7b4 4. Future orientation: the control of technology and technological assessment; 7b4

7b5 5. Decision-making: the creation of a new 'intellectual technology'." (24) 7b5

7c The concept of the post-industrial society has become widespread in the futures literature. In most cases it is not defined in the depth undertaken by Bell. Use of the term usually indicates that the author is referring to an emerging service/information/knowledge based society that is in the process of being formed out of the existing mass consumption economies. This new society is regarded as an evolutionary step rather than a revolutionary one. It does not imply that many other forms of civilization will not co-exist in the world at the same future time period. It is not necessarily "best" for all , although it could be less energy intensive, less a consumer of scarce materials , and more conscious of human values than earlier eras. 7c

7d The concept of productivity in a post-industrial society is an important one but one that has to be refined. (24) The "worker" is more likely to be a managerial or knowledge worker as opposed to the production line employee of the past. The process of getting more output from the same input is different. If we assume that the knowledge worker produces a measurable output, how can we increase that output with the same amount of labor? Information and telecommunications technologies appear to offer significant promise in this area. 7d

7e The promise of information and telecommunications technology for productivity improvements in the service based post-industrial society becomes clearer when we examine the key sectors of that society. Government is the largest sector of the service economy. Although it is often fasnionable to despair of any improvements in government efficiency, many departments and agencies are becoming very conscious of the benefits that accrue to the wise users of telecommunications and information systems. Traditionally, governments have been the largest consumers of telecommunications services and we can expect this to continue. Perhaps it is easier to examine new application areas than to try to untangle the existing framework and evaluate the benefits of telecommunications systems. 7e

7f Some of the important new application areas will be in the local government field. Federal, state, and provincial governments have utilized information systems for some time. City governments are starting to utilize systems in order to solve their own problems which are often unique to local government. For example, proposals have been developed to use interactive cable systems in Los Angeles to provide effective local service outlets verses centralized city hall services. (25) These services, many of which will be offered in ghetto areas, have only been availableat a central city hall in the past and were not well utilized by residents. The use of these services often resulted in long time consuming travel and waiting by the citizens. The use of electronic city halls in the service consuming neighborhoods will result in a more productive use of the time of both the citizens and the civil servants. The tri-state two way televison system used in the New York area has resulted in more effective training and education for public servants and a reduction in local time consuming travel by city officials for routine meetings. There are many more similar types of experiments underway or proposed. The late seventies will see continued experimentation and the next two decades will see widescale adoption in large urban areas. These systems should contribute towards the goal of improving productivity in the local government sector. 7f

7g The industrial sector of the service economy can benefit significantly from the judicious use of telecommunications based systems. The transportation sector is one of the largest in the economy and cannot be expected to be reduced too much, even with new government policies and some measure of travel/communications substitution. The use of effective information systems can help track the flow of freight much more effectively. Better freight control can result in smaller inventories in business and hence a more productive use of one of the scarcest resources: capital. The use of mobile communications in local transport systems for both

people and goods transfer can result in less wasted motion and hence a smaller energy and economic cost. 7g

7h The finance, banking, and insurance industries are among the giants today and will remain so in the post-industrial age. The dependance of these industries upon information and telecommunications systems is well documented. In many ways they are models of the future and illustrate how other parts of the service sector will look to telecommunications for productivity improvements. 7h

7i The field of education will also benefit from information technology. Links to computer based education systems will help supplement regular classroom training. Two way television systems will help students to attend classes remotely from their job locations or homes. These types of systems already exist at Stanford University and the University of Southern California. Many more will develop in the next two decades. Information banks will aid in academic research and the organization of knowledge. As the pressure on educational budgets increases, educational administrators will turn towards these systems in order to improve productivity in the educational sector of the post-industrial society. 7i

7j This examination of the traditional economic sectors overlooks the fact that the information sector will be an important one in its own right. It is interesting to note that the older sectors of this industry, as opposed to the new members such as time sharing companies, data base organizations, and specialized common carriers in the telecommunications field, are turning to telecommunications and information technologies in crucial attempts to resolve internal productivity issues. These charter members of the post-industrial society who are looking at telecommunications based systems as lifelines include post offices, book and magazine publishers, newspapers, and telegraph companies. The new rapidly expanding organizations in the information industry are growing precisely because their services improve the productivity of their client organizations. 7j

7k The information industry has one vital characteristic that will have an important influence on the national economy as information becomes a key sector. The consumption of an information product does not result in the consumption of the raw resources required to create it. Hence, a data bank can be accessed by many users, computer software can be recreated in new locations for a minor fraction of the cost of its original development, and educational programs can be recyled many times. An economy that has information creation and consumption as an important sector will be less dependant on energy and resource consumption, less

damaging to the environment, and less dependant on international trade fluctuations. All of these issues have important productivity implications. 7k

71 Once again, this overview of a future impact of telecommunictions based systems has only been cursory in nature. These issues have been explored elsewhere at greater length and rigor. However, it is hoped that these brief comments have indicated how one of the important opportunities in the future for telecommunications lies in the area of productivity improvement in the evolving service-based post-industrial economy. 71

8 Future Impacts of Telemedicine 8

8a The delivery of medical services to patients is one of the most important functions of a modern society. Medical parctice has changed from the individual general practitioner serving those in the near vicinity to the development of micro-specialization and technology dependent systems of treatment at centralized and specialized centers. The demand side of the equation has also changed drastically in the past few decades. Medical treatment is rapidly becoming considered a right rather than a luxury for those who can afford it. Medicare and Medicade systems have been established in many countries and they are inevitable for the U.S. as well. Nurses and medical technologists are assuming important first contact roles. Paramedics are delivering emergency care in remote areas or to accident victims. Patients are screened and tested before they even see a doctor. These and many other major trends have created an environment where telecommunications based medical systems will be of increasing importance in the next two decades. 8a

8b Several types of computer and communications based services will become more utilized in the next two decades. These will be reviewed in the next few paragraphs. The next part of this section of the paper will review the growing experimentation with various forms of visual communications in the medical environment. These examinations should permit a greater understanding of the opportunities that will arise from the use of telecommunications based systems in the future. 8b

8c Trends in Medical Technology 8c

8c1 Multiphasic Screening 8c1

8c2 Multiphasic screening systems are first step, pre-diagnosis tests that permit the routine taking of medical history, cardiopulmonary, anthropometry, sensory function, and body fluid tests. These tests are taken and analyzed by

computers before the patient even sees the doctor. A Bell Canada Delphi study of Medical Technology forecasted that these systems will be in widepread use (20 to 55% of most major hospitals and medical centers) in the next two decades. (26) 8c2

8c3 Computer Assisted Diagnosis 8c3

8c4 This is the next step beyond multiphasic screening. The computer can also assist in identifying potential medical problems and indicate areas for further analysis by the physician. This is not designed to replace the doctor but give him an assist and make better use of his or her scarce time. The Bell Delphi indicated that this would be a significant force in the 1980's and 1990's. 8c4

8c5 Remote Physiological Monitoring 8c5

8c6 This takes place today in many hospitals in intensive care wards. It is expected to take place on a more widescale basis across many hospital functions. Certain types of patients will also be placed under this form of care in their homes or even in normal daily life. Frequency limitations will mean that most of this will take place over the telephone rather than via continuous radio contact. 8c6

8c7 Computerized Medical Library Systems 8c7

8c8 The use of computer based medical information systems is another important aid in both medical education and the delivery of health-care. These centralized systems will be accessed via normal terminals located in hospitals and other medical facilities. They are also currently available in voice form so that doctors can call central libraries and receive taped lessons on specific topics. The use of voice and video cassette systems will also help in the delivery of new medical knowledge or refresher courses on important subjects. 8c8

8d Visual Medical Communications Systems 8d

8d1 There have been a number of ambitious experiments funded by the U.S. Department of Health, Education, and Welfare. These experiments were launched to test visual telecommunications in a number of medical environments with differing needs. There were three general hypotheses associated with the tests: 8d1

8d1a "1) this technology could facilitate the functional aggregation of dispersed health-care resources, permitting third-level resources (e.g., highly skilled specialists and expensive equipment) to be geographically centalized for

efficiency and cost containment and first-level resources (e.g., general practitioners and neighborhood clinics) to be geographically decentralized to improve the accessibility of health-care;
2) this technology could "redistribute' health-care personnel from areas of abundance (high-income urban and suburban) to areas of scarcity (low-income urban and rural); and
3) visual telecommuncation could mitigate the depersonalization of the health-care system that might otherwise accompany certain organizational changes already underway to decrease inefficency, reduce duplication, and control costs." (27) 8d1a

8d2 The experiments tested a wide variety of visual technologies ranging from PICTUREPHONE through to interactive cable television, laser links, and private microwave links. The test beds are in urban, rural, and semi-rural areas. The systems were used in a variety of ways . They can be summarized in the following categories: 8d2

8d2a Consultation
This involved consulation between various professionals in the health-care delivery system, with or without the patient being present. 8d2a

8d2b Supervision
This entails the direction of medical activities by a more skilled health worker over a lessor skilled one. 8d2b

8d2c Direct Patient Care (Telemedicine)
This is the delivery of diagnosis and therapy services over the visual link-up 8d2c

8d2d Administration and Management
This category includes activities ranging from staff meetings to lab tests. 8d2d

8d2e Education and Training
Formal and informal delivery of educational services over the systems. (28) 8d2e

8d3 The results of the various experiments and their importance for the design of future systems are outlined in the paper by Maxine Rockoff. The importance of these experiments is that the various concepts are being tested in real-life situations rather than in artificial environments. They are providing

valuable data that will help in the design of larger scale operational systems. 8d3

8d4 The next two decades will see a significant increase in the use of telemedicine and medical telecommunications. The social pressures for equaltiy in access to medical care will make the use of many of these systems mandatory if the needs are to be met. The opportunites are great in scope just as will be the problems in bringing about the needed changes. The systems that receive widespread use will be integrated ones rather than the fractionalized and functionalized ones that exist in today's environment. Maxine Rockoff summarized this well when she concluded: 8d4

8d4a "Surely tomorrow's broad-band communications facilities will integrate audio, digital, and video communications, both person-to-person and person-to-computer. It is not improbable that the communications infrastructure of tomorrow will in part determine the structure of tomorrow's health-care delivery system because of its information-intensive character. " (29) 8d4a

9 Future International Impacts of Telecommunications 9

9a Telecommunications systems have had and will continue to have a significant impact on the international system. International telephone traffic has one of the highest growth rates in the telecommunications field. The development of communications satellites has led to worldwide television becoming an accepted part of daily life in less than a decade. Satellites are beginning to fulfill some of their promise for education through the use of interactive and one way broadcasts to remote Alaskan villages, throughout the Indian sub-continent, and into desolate areas of the U.S. midwest. All of these types of developments can be expected to grow in the next two decades to impacts of major importance. These developments are also well known and will not be discussed in any further detail in this paper. Rather, a more unknown, but important development will be examined. This is the impact that may develop as a result of the use of international computer networks and computer conferencing systems. These systems will augment the existing voice and video telecommunications networks in the next two decades and may have profound international implications . Some of these are reviewed below. 9a

9b Technology Transfer 9b

9b1 Sharing of scientific and technical information on an international scale has been one of the principle topics of discussion in international trade and foreign aid research. The main philosophy of technology transfer is summarized in the old parable that it is much better to teach a man to fish than to give him a fish to eat. The transfer of knowledge or technology can take place on a formal basis such as the licensing of patents or on an informal basis such as the presentation of technical papers at various conferences. Multinational corporations or organizations are often the agents of technology transfer. 9b1

9b2 Computer conferencing is a potential tool for technology transfer on an international scale. It can act as a form of electronic publishing and electronic mail to transfer technological information between countries. 9b2

9c International Collaboration 9c

9c1 The capabilities of computer conferencing for joint authorship and information dissemination have been utilized on a national basis. This has a special importance on an international scale, particularly for scientists in the Lesser Developed Countries. In many cases the leading scientists in Lessor Developed Countries leave their home countries in order

to carry on research with their peers in the industrial countries. This often occurs not for greater personal renumeration or better physical facilities, but from a desire to work with the leading researchers in the field in question. It is a need to be a recognized contributor member of the "invisible college" and to have access to the latest data on the topic. 9c1

9c2 Access to a computer conferencing network which had an on-going series of conferences on the scientist's areas of interest would enable him to become a member of the invisible college without leaving his home country. This would be of benefit to the scientist and his country while still permitting him access to the information he needs to conduct his research on a professional manner. It also enables the researcher to obtain the necessary ego reinforcement from his peers without physically joining them at a foreign location. One example of a computer conference based upon international collaboration is an energy modelling project currently underway. The chairman of this project resides in Japan; however, he wants to develop a model of world energy problems utilizing experts in North America and Europe. He is using a modified computer conference system available on an international time-sharing network. This system will permit joint collaboration on defining inputs to the model as well as the development of the model itself. This form of international cooperation would likely be impossible or too time consuming using normal forms of communications or face-to-face contact. 9c2

9d International Policy Determination 9d

9d1 The utility of computer conferencing for national crisis management has been tested sucessfully. These benefits exist on an international basis as well. The value is for more than short term crises. A recent paperby Kupperman and Wilcox of the U.S. Arms Control and Disarmament Agency discussed how computer conferencing could be used in international negotiations. The use of a technique such as computer conferencing for international policy determination and conflict resolution certainly makes the technique a valuable addition to the family of communications services. The authors note the significance of this in their conclusions: 9d1

9d1a "..., it is clear that computer conferencing can assist materially in preventing international conflict and resolving differences among nations. By contributing to understanding between nations with different value systems, computer conferencing can assist the participants in perceiving each other's interests and intents correctly, and

in generating valuable statements of principle. Coupling traditional techniques of analysis with computer conferencing methods can thus form the basis of a common meta-language to bring international agreements to a new level of clarity, based upon a single image of evolving 'reality' which each side has helped to generate. Surely there can be no finer application of computer conferencing than to the deterrence of war and improved understanding among nations." (30) 9d1a

9e Rome Futures Conference. 9e

9e1 Computer conferencing received unique recognition at the Special Rome Conference on Futures Research in October 1973. This Conference was attended by individuals from both the industrialized world and the Lesser Developed Countries. It was directed towards establishing linkages between worldwide human needs, new societies, and the required supportive technologies. The conference was a week long dialogue on various issues, including the need for continuing communications on these topics between the various world futurists researching future problem areas and potential solution sets. At the end of the week, the 160 participants were asked to vote on 15 proposals developed by working groups. The voting weighed both the "importance" and "practicability" of these proposals. The communications group proposed the establishement of a futures oriented international computer conferencing network: 9e1

9e1a "At present remotely located groups are unable to confer with each other on vital common issues, eg., villages on farming plans, futurists on world population growth. A task force should undertake the development of a multi-media network which includes progressively cassettes, videotapes, and ultimately a two way real time interactive, computer augmented conferencing network available to all groups in the world interested in the study of problems of the future on a continuous, ie. when wanted basis. The appropriate sponsor is the World Federation of Futures Studies with UN and/or Foundation support. Full time professionals would be required. The project should begin as soon as possible so that international operation would be affected within four years. 9e1a

9e1b As demonstrated by the conference, communications are not working as well as they should be; remotely located potential participants are absent and communications between successive meetings have been lacking. There are many uses for the same network. The technology is available today and analogous networks are now operating, eg., a worldwide

weather reporting system is available to all airports and used in all countries since the 1960's. The proposed concept can in fact use existing networks in many areas at a cost of $10 per hour or less". (31) 9e1b

9e2 The assessment of the conference participants indicated that these futurists felt that the computer conferencing proposal was of the highest importance and practicability. It was tied with the proposal for the development of a "new human rights framework" as the most desirable of the 15 proposals presented at the conference. It is significant that a group of non-communications specialists meeting on a topic as broad as world problems picked computer conferencing as one of the most important tools for futures research and planning to assist solving major world problems. The beneficial capabilities offered by computer conferencing appear to be recognizable by a broad range of individuals after the concept is adequately explained. 9e2

9f Village Systems 9f

9f1 Murray Turoff has proposed that computer conferencing could be used in Lesser Developed Countries for a wide number of routine activities in remote villages. He argues that computer conferencing systems based upon mini-computers could be made available for the equivalent price of a cheap truck. These systems could be used for a series of village applications: 9f1

9f1a Bid and barter conferences for various commodities both within the village and between villages. 9f1a

9f1b Regional and local planning activities. Village members could participate in decisions that would have an immediate impact upon them ie. road building, public construction, etc. 9f1b

9f1c Crop planning and agricultural data exchange. 9f1c

9f1d Access to remote experts and specialists who could help solve local problems remotely. These specialists could, for example, aid village paramedics or teachers. 9f1d

9f1e Government information exchange. The system can be used by government officials to distribute information to local leaders and obtain feedback from them. 9f1e

9f1f Personal message transfer between villagers. (32) 9f1f

9f2 One of the Nigerian speakers at the IFIPS and ICCC

Stockholm conferences provided a supporting analysis. (33) He noted that many underdeveloped countries are currently planning and installing their first nationwide telephone systems. It would be shortsighted for their planners to merely duplicate the systems available in the industrial nations. Existing telephone systems have been designed for voice communications and only used after the fact for computer communications. The speaker argued that the Lesser Developed Countries should design their new communications systems with computer communications applications also in mind. (34) If this philosophy is followed we may see the eventual development of new national communications systems which include computer conferencing features as a part of the overall communications service package. 9f2

9g International Applications: Summary 9g

9g1 Computer Conferencing shows promise of becoming a valuable communications tool on an international basis. It will be of value for both inter and intra organizational communications as well as serving a variety of needs in the Developing Countries. In this review of future opportunities for telecommunications over the next two decades this ranks as a rarely discussed but important "comer" to consider. 9g1

10 Conclusions: Some Negative Issues 10

10a The issues reviewed in the above four sections illustrate some of the benefical opportunities that may emerge in the new two decades as a result of the wise use of telecommunications. This paper does not assume that this is a clear or easy future. However, it rests on the basic assumption that the problem areas can and will be overcome. It is not the purpose of the paper to examine these issues in any detail. However, several of the most important areas of concern will be briefly highlighted in order to provide some small balance of the pros and cons of the issue. Several of the most important areas are listed below: 10a

10a1 Privacy 10a1

10a2 The adoption of telecommunications dependance as a significant conscious choice in many sectors of society will bring us face-to-face with many of the privacy and security issues that have been troubling many observers for the past decade. Dependence on computer and communications services for so much of our social interaction is certain to bring about periodic lapses in personal and institutional privacy. These issues have been discussed extensively elsewhere and this paper will go no further than to indicate that they certainly have relevance to this issue. 10a2

10a3 Loss of Interpersonal Interaction 10a3

10a4 Many social scientists and thoughtful observers have pointed out that work activities have a very high level of social interaction content. People need to interact with others on a purely social level and work settings create the ability for this to happen. Reduction of intercity travel may cut back the range of interpersonal experiences that individuals have access to during their travel. Reduction of commuting patterns through the use of remote work centers or home work centers would also have a severe impact on interperson interaction. If remote work centers were common public utilities rather than dedicated to specific institutions (a likely scenario in order to reduce the cost overhead of these institutions) then the interpersonal bonds that develop may be based upon friendships of others who happen to use the same work center rather than work for the same employer. This could have significant impact on job mobility patterns and employee loyalty. 10a4

10a5 Sector Unemployment 10a5

10a6 Gradual substitution is the most likely scenario for the future. However, if significant shifts occur in institutional

or individual attitudes, energy availability, environmental awareness, or the cost/benefit trade-offs between travel and telecommunications then we could expect to see rises in the unemployment levels in the transportation sector. This is not a minor factor. The transportation unions are some of the strongest in North America and have a long history of fighting (successfully) technological or policy advances that they perceive as having a negative impact on their members. The telecommunications industry is far more automated than the transportation industry and a corresponding growth in employment in the former field would not likely follow cutbacks or reduce growth in transportation. The transportation industry also has a successful history of lobbying with the political sector of our society and we might expect to see attempts to make telecommunications use a political issue if the industry began to see it as a significant threat to present or future business growth. 10a6

10a7 Disruption Potential 10a7

10a8 Just as significant reliance on telecommunications creates a privacy problem, it also raises potential dangers of massive failure, sabotage, strike shut-downs, and breakdowns due to natural disasters. Systems will have to be designed in a fashion similar to the existing telephone network. This means considerable redundancy, distributed intelligence, human back-up and control override capabilities, and rapid recovery ability. There must also be the capability to eliminate the cascading disaster possibility which has caused major problems in the electrical industry. The potential dangers here certainly weigh heavily against a very centralized system. 10a8

10a9 Access Rights 10a9

10a10 The question of who will be allowed or will be able to afford access to the technology that can make all of the above forecasts possible has troubled many observers. The phrase "information rich and information poor" has come to symbolize this concern. It can be argued that substitution, especially for local transportation, will only result in the creation of further ghettos. The poor will be even more cut off from the affluent who will be able to work in electronic isolation from the underprivileged. If the urban substitution process was carried to its ultimate conclusion, large cities would have their economic structures cut out from underneath them. The commuters would cease to be a source of tax revenue and hence cut out a significant slice of city revenues. On the other hand, many clerical and support jobs might move to the electronic work centers where the poor could not afford to

commute, thus creating employment dislocations. The support industries of the city (restaurants, shops, service trades, etc.) would lose significant markets. This negative scenario postulates a drop in the revenue base of the city along with a great increase in the need for social support systems as the underprivileged see their employment opportunities shrink. (35) The scenario is quite likely never to occur. As noted above, there are many social and other reasons to expect employees to want to go to the central offices several days a week. In addition, we could expect to see government and business leaders take positive actions to avoid most of the severe impacts postulated above before events got out of hand. Nevertheless, the question of access to telecommunications systems and the social/political impact that would develop from their widespread use must not be treated lightly. 10a10

10b There are certainly other potential negative implications of the uses of telecommunications. This short list is merely presented to indicate the range of possibilities and an agenda for further readings. However, on the balance, the author feels that telecommunications offers great promise in the future to meet a wide range of societal needs as long as choices are made wisely and with the potential dangers always in mind. (37) 10b

11 Footnotes 11

11a 1. The references shown in the following footnotes may help guide those who wish to pursue an area further. 11a

11b 2. Further details on the activities of Bell Canada's Business Planning group may be found in: Lawrence H. Day, "Long Term Planning in Bell Canada", Long Range Planning, Vol. 6, No. 3, September 1973, and Lawrence H. Day, "The Corporate Role in Technology Assessment: A Case Example", First International Congress on Technology Assessment, The Hague, The Netherlands, 29 May 1973. Also in Technology Assessment, Vol. 2, No. 1. See also: Lawrence H. Day, "The Future of Computer and Communications Services", National Computer Conference Proceedings (Montdale, N.J., AFIPS Press, June 1973), page 730 11b

11c 3. Committee on Telecommunications, National Academy of Engineering, Telcommunications Research in the United States and Selected Foreign Countries: A Preliminary Survey (2 vols), N.T.I.S. Washington, D.C., June 1973. 11c

11d 4. Studies here with detailed descriptions include: Walter S. Baer, Interactive Television: Prospects of Two-Way Services on Cable (Santa Monica, Calif., Rand Corporation, November 1971); Paul Baran, Potential Market Demand for Two-Way Information Services to the Home (1970-90)(Menlo Park, Calif., Institute for the Future, R-26, December 1971); Michael T. Bedford, The Future of Communications Services in the Home (Montreal, Que., Business Planning, Bell Canada, November 1972; proprietary); Sloan Commission on Cable Communications, On the Cable: The Television of Abundance (New York, McGraw-Hill, 1971); Ralph Lee Smith, The Wired Nation (New York, Harper Colophon, 1972) 11d

11e 5. Papers that describe this system include: Alesch, D.J., Intergovernmental Communication in the New York-New Jersey-Connecticut Metropolitan Region, RAND Corp., Report R-977, Santa Monica, Calif., May 1972. Alesch, D.J., and G.C. Sumner, MRC's Method of Evaluation for the Metropolitan Council Telecommunications System, RAND Corp., Report R-1000, Santa Monica, May 1972. Bretz, R., L.A. Dougharty; Two-way TV Teleconferencing for Government: The MRC-TV system.; R-1489-MRC; Rand; Santa Monica; April 1974. 11e

11f 6. Douglas C. Engelbart, Richard W. Watson, James C. Norton, "The Augmented Knowledge Workshop", National Computer Conference Proceedings (Montdale, N.J., AFIPS Press, June 1973), page 9 11f

11g 7. Members of the Business Planning group will be testing this concept in real life for the next year. The group has

subscribed to an experimental system to be run by Engelbart's group and will test many of the work-from-home and information retrieval capabilities. This experience will be evaluated on a scientific basis to determine the positive and negative changes in group behaviour and output over the length of the experiment. 11g

11h 8. Two collections of papers that explain this concept in detail may be obtained from ARPA: Resource Sharing Computer Networks, Advanced Research Projects Agency, Department of Defence, Washington DC, 1972 (session presented at Spring Joint Computer Conference, Atlantic City, 7 May 1970); The ARPA Network, Advanced Research Projects Agency, Department of Defence, Washington DC, 1972 (session presented at Spring Joint Computer Conference, Atlantic City, 16 May 1972) 11h

111 9. Further details on computer conferencing may be found in: Lawrence H. Day, "Computer Conferencing: An Overview", forthcoming in a National Science Foundation (U.S.) sponsored volume on the International Conference on Computer Communications (Stockholm, 1974), edited by Nathanial Macon, Washington, D.C. 111

11j 10. This topic is reviewed in more detail in: Lawrence H. Day, "Factors Affecting Future Substitution of Communications for Travel", Joint National Meeting, Operations Research Society of America and The Institute of Management Sciences, San Juan, Puerto Rico, Oct., 1974. 11j

11k 11. This has been discussed by Reid in his report to the Sloan Commission on Cable Communications: Alex Reid, New Directions in Telecommunications Research, Communications Studies Group, Joint Unit for Planning Research (University College London and London School of Economics), London, June 1971, pages 4-6 11k

111 12. James H. Kollen, "New Perspectives on the Travel/Communications Tradeoff", National Association of Educational Broadcasters Convention, Las Vegas, Nevada, November 18, 1974. 111

11m 13. A recent survey by the OECD is the first attempt to gather this data on an international basis. It is unpublished for formal distribution at this date. 11m

11n 14. Michael Katsoulis, internal memorandum, Business Planning Group, Bell Canada, Montreal, Canada, April, 1974. 11n

11o 15. Michael Katsoulis, Energy Impacts of Passenger Transportation, Business Planning , Bell Canada, Montreal, Canada, April, 1974. 11o

11p 16. Peter C. Goldmark, "A Rural Approach to Saving Energy: Technology Could Help Ease Urban Congestion", New York Times, Nov. 12, 1973, p.12. 11p

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11r 18. Paul Polishuk, "Telecommunications and the Energy Crisis", Telecommunications, Feb. 1974, p. 23. 11r

11s 19. Roger Rye, Michael Tyler, and Brian Cartwright, "Travel or Telecommunicate? The Energy Considerations", Presented at: Exploring the Limits to Growth of Telecommunications--Energy and Materials, IEEE Washington Section and Technological Forecasting and Assessment Office, Feb. 20, 1974. 11s

11t 20. Ibid., p. 9. 11t

11u 21. Edward M. Dickson, Raymond Bowers, The Video Telephone: A New Era in Telcommunications, a preliminary technology assessment (Ithaca, N.Y., Cornell University, June, 1973), Chapters 10, 15 11u

11v 22. E.M. Van Vleck, "Substituting Telecommunications for Travel: Feasible or Desirable", IEEE National Telecommunications Conference, San Diego, Calif., 3-5 Dec., 1974, pp. 4-5. 11v

11w 23. Ibid., p.6. 11w

11x 24. Daniel Bell, The Coming of the Post-Industrial Society: A Venture in Social Forecasting, Basic Books, New York, N.Y.,1973, p.14. 11x

11y 25. Two recent efforts at this definition process were conferences sponsored in part by the Engineering Foundation and the U.S. Dept of Commerce: Alan McAdams and Madeline M. Henderson, Report of Conference on Making Service Industries More Productive Through Computers and Automation, National Bureau of Standards, NBSIR 74-515, Washington, D.C. June 1974 and a corresponding conference on Productivity Improvement in the Service Sector Through Information Transaction Technology, July 28 to Aug 2, 1974 (no report yet available). 11y

11z 26. ANNenberg School of Communications, Implementing Two Urban Telecommunications Experiments Designed to Deliver Municipal Services, (proposal to the National Science Foundation), University of Southern California, January 1975. 11z

11a@ 27. Frank J. Doyle and Daniel Z. Goodwill, An Exploration of the Future of Medical Technology, Business Planning Group, Bell Canada, Montreal, Canada, March 1971, p. 23. 11a@

11aa 28. Maxine L. Rockoff, "An Overview of Some Technological/ Heath-Care System Implications of Seven Exploratory Broad-Band Communications Experiments", IEEE Communications Society Transactions, January, 1975, p. 20. 11aa

11ab 29. Ibid., pp. 22-24. 11ab

11ac 30. Ibid., p. 29. 11ac

11ad 31. P.H. Kupperman and R.H.Wilcox, "Interactive Computer Communications Systems-New Tools for International Conflict Deterrence and Resolution", Proceedings of the Second International Conference on Computer Communications, Stockholm, Sweden, August 1974, p. 471. The authors have also prepared (with Harvey A. Smith) a paper on this subject that has been published in Science ("Crisis Management--Some Opportunities", Science, Vol. 187, Feb. 1975, pp. 404-410). 11ad

11ae 32. Harold A. Linstone, "The Working Groups: A Focus on Action" in Human Futures: Needs-Societies-Technologies, Futures, IPC Science and Technology Press Limited, Guildford, Surrey, U.K., 1974, p. 163. 11ae

11af 33. Murray Turoff, "potential Applications of Computer Conferencing in Developing Countries", Proceedings of the Special Rome Conference on Futures Research, Istituto Ricerche Applicate Documentazione e Studi, Rome, Italy, 1974. 11af

11ag 34. These were respectively: The International Federation of Information Processing Societies and International Conference on Computer Communications held in Stockholm, Sweden during August, 1974. 11ag

11ah 35. Remarks made at both the IFIPS and ICC 74 Conferences by J Fagbemi of Nigeria. 11ah

11ai 36. An extensive analysis of this type of scenario can be found in : Cetron, Marvin J. et al, An Analysis and Report on the Technology Assessment of Urban Telecommunications Research, Forecasting International, Report to HUD, Washington, D.C., Aug. 1973. 11ai

11aj 37. This paper has been prepared on the OFFICE-1 computer system operated by the Augmentation Research Center at the Stanford Research Institute (see footnotes 6-7). The Business Planning Group is supporting this work in an attempt to trial the SRI concepts in an industrial work environment. 11aj

12

IMM 19-JUN-75 05:33 32784

FUTURE OPPORTUNITIES IN TELECOMUNICATIONS

(J32784) 19-JUN-75 05:33;;;; Title: Author(s): Inez M. Mattiuz/IMM;
Distribution: /LHD([INFO-ONLY]) ; Sub-Collections: BELL-CANADA;
Clerk: IMM; Origin: < MATTIUZ, DIRK.NLS;1, >, 3-JUN-75 08:53 IMM
;;;;####;

IMM 19-JUN-75 05:35 32785

COMPUTER CONFERENCING: AN OVERVIEW

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International section originally presented
at MEXICON 74, Mexico City, Mexico,
August 28th, 1974.

Overall paper prepared for a forthcoming
book based upon the 1974 Stockholm
International Conference on Computer
Communications edited by N. Macon.

Also presented at the Airlie House 1975
Conference on Telecommunications
Policy Research
April, 1975.

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COMPUTER CONFERENCING: AN OVERVIEW

LAWRENCE H. DAY

INTRODUCTION

The subject of teleconferencing has attracted widespread attention in the communications field in the past few years. This interest has occurred from two different perspectives. The first perspective deals with the usefulness or needs for various forms of teleconferencing systems. This type of research starts with the telecommunications system and moves out to assess the potential imparts that may emerge through its use. The second perspective has been to research a potential impact area such as the potential of future substitution of communications for travel and then examine how specific teleconferencing systems will effect the substitution process. This paper will move from the former perspective, recognizing that both are equally valid.

Teleconferencing refers to communications between groups of individuals at separate locations. This is opposed to telecommunications which is usually considered as communication between two individuals at separate locations. The distinction between group-to-group and individual-to-individual communications is the key point. Computers or terminals may, of course, be at one end of a telecommunications link (ie. information retrieval or time-sharing).

Computer conferencing is one form of teleconferencing. It is, to date, the least known and/or understood member of the teleconferencing systems family. A basic definition of computer conferencing is:

> The use of shared computer files, remote terminal equipment, and telecommunications networks to facilitate group communications where face-to-face contact is either not possible or less desirable.

In the case of computer conferencing, the shared computer file is the text of all of the interactions between the individuals participating in a particular computer conference. Various system features, which are discussed below, permit the users to input, edit, and retrieve both public messages or private messages that are directed toward specific individuals. The remote terminal

equiment can consist of any interactive hard or soft copy machine. The telecommunications network is usually the public switched telephone network or a widely used private network such as the U.S. government's ARPANET.

History

It is interesting to note that the development and interest in computer conferencing did not arise initially from efforts to develop a new form of teleconferencing. Computer conferencing has its roots in technological forecasting research, more specifically, in research designed to improve upon the Delphi forecasting technique. Delphi is a futures forecasting technique which attempts to outline potential technological or social developments through the use of expert opinion. A Delphi study consists of several rounds of anonymous questionnaires between designated "experts" on the subject area. In each of the questionnaires, the median group forecasts are reported along with supporting comments, assumptions, etc, in order to justify both the median forecasts and the dissenting opinions. Consensus between the experts is often reached during two or three rounds of the study. However, the mechanics of the process often consume between six and nine months for a typical study. The process is also relatively inflexible. These and other difficulties led to interest in "on-line Delphi" systems in several groups. These issues were summarized summarized in an ICCC 72 paper by Lipinski et. al.:

> "Some of the disadvantages of the conventional mailed questionnaire procedure are the following:
>
> -it is relatively time consuming, both in the mailing and receiving of questionnaires (even one round takes a month or longer) and in the coding and keypunching of the data required for batch computer processing and analysis of the results;
>
> -the interaction between the expert and the investigator occurs infrequently and only through questionnaires -- as a result, an expert cannot easily obtain clarification on what is meant by a particular question, seek additional background data, and so forth;
>
> -the interaction between experts occurs only infrequently and only in the form of information feedback -- as a result, the panel may not be able to frame a fully agreed-upon lottery or model for any given question under consideration;

-the procedure may lack the stimulation provided by face-to-face conferences;

-complete anonymity does not inspire credibility among the experts; and

-because of the infrequency of interaction and because the procedure is already overly time-consuming the credibility of the results are not easily checked. The pressure for expeditious production of substantive results usually prohibits adequate attention to significance testing, replication, proximate validation, and the like...

This last difficulty is by far the most serious, for it calls into question the validity of all study results obtained by conventional procedures. If we wish to make efficient use of the complex procedures available for analyzing and validating data, to have more interaction among the experts, and to do all this within practicable limits of time and cost, it now seems clear that we must use some form of computerized conference." (1)

The above conclusions reached by researchers at the Institute for the Future (IFTF) had also been reached by others, including Murray Turoff, Richard Wilcox, and Robert Kupperman while at the U.S. Office of Emergency Preparedness and the author's Business Planning Group in Bell Canada. The OEP and the IFTF researchers developed software packages to fulfill these objectives. The Business Planning Group has utilized these and other systems and has developed its own modified conferencing capabilities.

The next section of the paper describes the features of several of these conferencing systems. All of these conferencing systems were discussed in papers at the first Washington International Conference on Computer Communications and updated reviews were presented at the Stockholm ICCC. The views expressed here are a synthesis of data gathered at those two conferences and information gleaned through extensive hands-on user experience with all of the major computer conferencing systems discussed below.

COMPUTER CONFERENCING SYSTEMS

BASIC FEATURES:

Computer conferencing systems have various features or operating characteristics that are unique to each particular system. However, there are a number of features that are common to several of the most popular systems. These features are discussed in this section of the paper. The following section reviews several of the specific systems and presents the author's subjective comparison of them.

Shared Files

As noted above, the key capability of computer conferencing is the ability for a defined set of individuals to write on a single file which represents one "conference". The shared file capability is one of the features of computer conferencing that distinguishes it from computer-based message switching or ordinary TWX and Telex service. The computer conferencing system stores all of the messages in one file which enables message retrieval through key words, words in content, message numbers, name of individual sending the message, and so forth. This capability also enables the user to edit messages.

Text Editing

Text editing capabilities allow the user to edit his message before he sends it or after the fact if he wishes to add or delete material. This editing capability is only extended to the sender of the message, not the readers. One exception in some systems is the ability of the chairman to alter other individuals' inputs (presumably with their prior knowledge and approval).

Synchronous and Asynchronous Message Handling

Most forms of telecommunications interaction, as opposed to broadcast communications, are synchronous in nature. The sender and receiver of the messages interact in real-time and must be available at a common point in time to communicate. Exceptions to this rule are telegraph-based services which, like the mail, are asynchronous in nature.

Experience has shown us all that often the toughest part of organizing a conference, meeting, or teleconference is to find a common point in time when everyone is available for

the meeting. One of the features of computer conferencing asynchronous message handling, permits the conference attendees to devote time to the meeting at their own convenience, not that of a larger group of conferees. While synchronous communications takes place when more than one individual is on-line to a conference at a point in time, many users feel that the asynchronous feature is one of the main strengths of computer conferences. This becomes especially important when conferees are spread across many different time zones.

Private Messages

Computer conferencing systems have the capability of allowing private messages to be sent between various individuals in the conferences. This duplicates the availability of this "feature" in personal meetings. However, private messages in computer conferencing are not so potentially disruptive as are whispering and note passing in face-to-face meetings.

Anonymous Inputs

A related feature to private messages is the ability of the user to send anonymous messages. This is useful for Delphi-like discussions where the message rather than the sender should be the key factor. The anonymity capability is also useful for debates that become emotional or where a number of participants are from various levels in a management hierachy.

Complete Conference Record

A computer conference provides a complete record of all of the public discussions. This is especially important for some meetings. It eliminates the need for meeting minutes (unless a summary is also required) and reduces the dangers of being "misquoted" or having a comment taken out of content. This feature is one of the reasons why text editing is required by the participants. Complete transcripts are not usually provided for normal face-to-face discussions (Watergate Tapes aside;) and participants do not have to be as careful in what they say or how they say it. While this might be a threat in certain circumstances, the complete transcript is regarded as beneficial by most users. In one recent case, the transcript of a computer conference was "cleaned up" (spelling and all-capital letter messages corrected to

normal styles of presentation) and issued as a report on the evolving state-of-the-art in the conference topic area. (2)

Conference Analysis

The availability of a complete conference record enables the participants and the chairman to analyze the effectiveness of an on-going meeting or one that has occurred in the past. For on-going conferences, this permits the chairman to take time to reflect upon and redirect the meeting down more productive channels. This is virtually impossible in face-to-face meetings or synchronous teleconferences. Hence, after a meeting, participants often play the "why didn't we do or discuss this...? "game". This "game" is possible during an on-going computer conference since these "meetings" may go on for several weeks or months.

Post-conference analysis is also possible with computer conferencing. This can be from several perspectives; who were the most "talkative" or productive conferees; did a sub-group dominate the meeting, how affective or effective were the conferees, etc. A later section of this paper will review several analyses of a major computer conference.

Housekeeping Features

Most systems have a number of features that facilitate the use of the conference capabilities. The computer stores the last message read by each conferee and only shows new messages to the individual each time he signs on to the conference. Similarly, the systems enable the user to determine how many messages a particular individual has read. All messages have a distinctive identification number to reduce referencing (eg. "re your comment in # 147..."). The systems also keep an up-to-date listing of who is currently on-line to the conference. This facilitates the sending of private messages that will be received immediately and the direct questioning of an individual in a synchronous fashion. Most systems also have a "help" feature that will prompt the user if he is uncertain about the available options.

This overview of common features across the various systems may reveal some of the pro's and con's of computer conferencing to the reader. Further elaboration in this

vein follows in the review of some of the specific computer conferencing systems.

COMPUTER CONFERENCING SYSTEMS

OEP Systems

Dr. Murray Turoff and his OEP colleagues are the acknowledged creators of the first operational large scale computer conferencing system. Turoff (now with the New Jersey Institute of Technology), Wilcox and Kupperman (now with the U.S. Arms Control and Disarmament Agency) developed two versions of computer conferencing while at the Office of Emergency Preparedness (OEP), Executive Office of the President. Turoff's work started with the development of on-line Delphi systems after he had conducted extensive research into the Delphi technique. The work of Wilcox and Kupperman come from the direction of the on-line management information and project control systems that they had been developing. The impetus of the Nixon Price Freeze created the climate for a merger of these two activities and led to the development of a system they called EMISARI (Emergency Management Information System and Reference Index). This system enabled the OEP field offices to contribute to the creation of common reports and to exchange messages on items of mutual concern. Turoff in turn built upon this experience and developed two forms of computer conferencing that he called "PARTY LINE" and "DISCUSSION" which are desribed in more detail below. The growth of EMISARI into further forms of computer conferencing is also traced at a later point in this review of system development. The OEP system received a large test in an operational environment when that Office used it for the management of the Phase I program of the Nixon wage-price freeze. The success of this system during that crisis proved that computer conferencing was of value in a non-academic surrounding.

The initial Turoff systems were called "Party-Line" and "Discussion". The essential difference between the two was that the first was for synchronous conferences and the latter was asynchronous. Turoff describes Party Line as follows:

" "PARTY-LINE" operates very much like a conference telephone call. Group members wishing to hold a discussion go to their respective terminals at an agreed upon time and call up the system on the computer. If some are late in

joining the conversation, they will receive first a copy of the discussion as it stands. A member of the conference call has only two basic modes of operation;

(1) he can be typing in a message and when he signifies (by typing a plus sign) that he is finished, the computer adds his input to the end of the message list, assigns a unique message number to it and signs the author's name;

(2) if the conference member is not writing, or waiting, then he is receiving any messages written by others that have been added to the list since he last received messages. This is similar to either talking or listening on a telephone, with the one difference that everyone is asynchronous with the system, ie., they could all be typing or receiving at the same time or any mix of the two. There are a number of convenience features for example, a way of retrieving earlier messages, a way to cause the individual terminal to pause for a fixed length of time or until a new message is generated, and a choice of special text editing commands." (3)

He goes on to point out the difference between Party Line and Discussion.

"When everyone has signed off, the file of messages that has been stored in the computer disappears and only the individual terminal printouts remain as records. It is in this property that the "DISCUSSION" system differs from PARTY-LINE. Where PARTY-LINE requires the group to coincide in time, the DISCUSSION version does not. The DISCUSSION file stays in the computer until the moderator (the one who started the particular discussion) decides to delete it. The members of the discussion may get on the terminal whenever they wish to observe what comments have been added and to enter additional comments. The DISCUSSION system may then be used to discuss a topic over days or weeks. The moderator of the discussion also has the ability to shape the list of comments into a more compact set by either editing or deleting items. With code names or pseudonyms it may also be used for a Delphi type discussion. The DISCUSSION system is, in essence, a non-voting version of the DELPHI CONFERENCE system that has also been implemented at the Office of Emergency Preparedness." (4)

The Turoff system has been used in several U.S. and Canadian government agencies, Bell Canada, and is now available on a number of commercial timesharing systems.

COMPUTER CONFERENCING: AN OVERVIEW

The Business Planning Group at Bell Canada has had a second generation Turoff system developed at Bell-Northern Research in Ottawa, Ontario. This system was developed in conjunction with Turoff at Newark. The modifications were based upon user feedback during Canadian trials of the original program.

Current activities are concerned with developing a mini-computer based version of the modified program. Existing systems utilize large computer systems such as UNIVAC-1108's or PDP-10's. This is really a form of computer overkill since these systems have far greater capabilities (and higher cost structures) than are required for computer conferencing applications. While it was certainly logical to use large time-shared computer systems for first generation computer conferencing systems, utilizing mini-computers is the logical (and cheaper) approach for second generation computer conferencing systems.

The work initiated by Kupperman and Wilcox has been carried on with further modifications to their overall package of conferencing techniques (5). This evolution was reported upon at the Stockholm ICCC . The paper noted that the name of the package has been changed to RIMS (Resource Interruption Management System) with the addition of new features and applications. The changes were described as follows:

"Experience with the RIMS family of computer communications systems over the past three years has served to sharpen a number of the issues related to this emerging field. First of all, we have been able to design new modules, on the basis of hard experience rather than on the purely conceptual framework that led Turoff to the pioneering designs of PARTY-LINE and EMISARI.

The newest member of the RIMS family, NOTEBOOK, includes such major features as:

Ability to build text from messages either by concatenating selected text segments or by summing numerics across the file.

Ability to retrieve by author on a From-To date basis for purposes of quality assurance and performance evaluation.

Ability to perform mass editing by combined retrieval and

updating on a From-To date basis or on any other numerical variable.

Ability to establish page length before retrieval time.

Availability of search lists by date of most recent search, by list of most frequently found keys, and by list of most frequently sought and not found.

Ability to modify file control block parameters dynamically and transparently to the users.

Ability to perform interactively a succession of nested searches with only one pass through the master file." (6)

Turoff has also continued to modify his existing system with the cooperation of several time sharing system operators and the Bell Northern Research team. His current emphasis at Newark is based around the development of a mini-computer based system in parallel with the BNR effort. In his ICCC paper Turoff noted that the use of mini-computers could have a significant inpact:

"The economics of mini-computer use are such that a system capable of serving a 100 simultaneous users on a two shift basis and at 50% utilization on the average can be brought to the user at $2 per hour per user. This is use based on a five year amoritization of the equipment as well as operating costs." (7)

IFTF "FORUM" System

The IFTF work in computer conferencing was also derived from a background of extensive experience with Delphi studies. The institute researchers wanted to develop computer conferencing system that could be used by experts who may be uninitiated in the use of computer systems. The system should essentially be transparent to the experts whose time was limited and expensive as well as difficult to schedule. The learning curve should be short. The IFTF researchers described their goal as follows:

"To create an advanced form of teleconferencing we have implemented and successfully tested a computer system named FORUM that is currently usable on the computer network of the Advanced Research Projects Agency. The basic idea of FORUM is to allow unhampered interaction of experts under the guidance of a chairman who (1) defines the topic of a

discussion; (2) assembles a panel of experts or participants on that topic; and (3) presents the initial background material relevant to the subject. Each participant communicates with the computer network via a convenient terminal. (It costs less than $150 per month to equip one participant.) FORUM conveys questions and answers, assembles group opinions, protects anonymous statements, and supplies other information to and within the group while the chairman monitors the proceedings and intervenes as necessary." (8)

The ICC paper described how FORUM has been structured in order to meet some of those objectives:

"FORUM is a computer program which functions as a communications medium for such activities as group conferencing, joint writing projects, electronic note pads, and questionnaires for geographically separated groups of people. The program is currently available on three DEC PDP-10 computers on the ARPANET computer-communications network and has been in use since March 1973. FORUM allows people to interact on a real-time or delayed basis and provides a means for interpersonal communication, for eliciting information, as well as for storing and retrieving this information. The program is currently handling over twenty activities of various types and is serving as a test vehicle for further research into teleconferencing.

FORUM may be used to collect information in either of the following formats:

Discussion. An open discussion in which blocks of textual data are entered and distributed to designated participants.

Question and Answer. The organizer of an activity elicits answers to specific questions; entries are not distributed to other participants unless the organizer explicitly asks FORUM to feed them back.

There are three basic types of entries. The most common type is the public entry, which is distributed to all other participants in the discussion. The second type is the private message, which is sent only to specified participants. The third type is the anonymous entry, which is sent anonymously to all participants in the discussion; absolutely no record of who made the entry is kept. To make

a public entry, a participant simply starts typing. Once he has completed the message, FORUM will send it to the other participants." (9)

The FORUM system has evolved through a series of software packages which provide a greater number of service features. Experimentation with various conferences has provided valuable user feedback during the various phases of system design. Further details on system use will be provided in the applications section of the paper.

Augmentation Systems

Computer conferencing capabilities have also been developed from a non-Delphi perspective. One important research project that is relevant here has been the focus on Augmentation of the Knowledge Worker at the Augmentation Research Center (ARC) at the Stanford Research Institute. This large scale project has started from the perspective of the user, the knowledge worker, and moved to the development of a wide range of computer capabilities that can aid him in his daily work. This is opposed to traditional computer systems development where standardized software packages are created and the users must fit their needs within the bounds of the system. The augmentation approach has been to provide a wide range of computer based tools to the knowledge worker who can select those that will help him as he goes about his work. This is similar to the IFTF philosophy of developing simple, but powerful, systems for non-computer oriented experts.

The Augmentation system enables the user to engage in a wide variety of document preparation, text editing, information retrieval, and computer conferencing activities. The strength of this approach is that all of these features are available in a common system and it is easy to merge and share the various capabilities in the computer conferencing mode. The essential difference between the Turoff and IFTF approach and the Augmentation approach is that the former are designed as computer conferencing systems and the latter is a powerful computer support system that also has some limited computer conferencing capabilities. The wide variety of Augmentation capabilities has been described elsewhere, thus, this paper will concentrate on the computer conferencing capabilities. (10) However, it should be noted that these features are shared with a number of computer

systems that are interconnected by the ARPA computer network (ARPANET).

There are three computer conferencing capabilities available on these systems: SENDMESSAGE, LINKING, and JOURNAL. SENDMESSAGE is a form of "electronic mail" whereby users can send messages or files to one or a number of other users. While there is not a central shared file, each user has a complete record of all messages directed to him and stored in his file by the computer. This enables him to carry on and record a dialogue with other users in a similar asynchronous fashion to other computer conferencing systems.

LINKING is described as follows:

"Consider two people or groups of people who are geographically separated and who want to collaborate on a document, study a computer program, learn to use a new aspect of a system, or perform planning tasks, etc.

The workshop supports this type of collaboration by allowing them to link their terminals so that each sees the same information and either can control the system. This function is available for both display and typewriter terminal users over the ARPANET." (11)

Linking is a synchronous activity and does not leave a permanent record. It is similar to the PARTY-LINE capability of the Turoff system.

The JOURNAL capability is the most formal conferencing subsystem in the Augmentation System. It has the following capabilities:

"The user can submit an NLS file [the type of file used on the Augmentation System], a part of a file, a file prepared on another system in the ARPANET (document), or text typed at submission (message) to the Journal system. When submitted, a copy of the document or message is transferred to a read-only file whose permanent safekeeping is guaranteed by the journal system. It is assigned a unique catalog number, and automatically cataloged. Later, catalog indices based on number, author, and "title word out of content" are created by another computer process.

Nonrecorded dialogue for quick messages or material not

likely to be referenced in the future is also permitted." (12)

The combined capabilities of SENDMESSAGE, LINKING, and JOURNAL systems provide many of the features provided by Turoff or FORUM systems. Their non-integration prevents them from being full-fledged computer conferencing systems. On the other hand, the wide capabilities of the Augmentation system which can be utilized in these three modes strengthen them as teleconferencing tools.

Computer Conferencing Systems : The Stockholm View.

The ICCC Conference provided a common forum where designers from the three above systems met and provided updated reports on current applications and development. Two Conference sessions had papers on computer conferencing. The discussions between panel members and individuals in the audience reflected a widespread interest in the subject and in the need to refine and further develop computer conferencing systems. The ICCC meeting also saw the formation of a group of individuals interested in the topic and who agreed to maintain continuing communications on the subject, preferably using the medium to do so. In retrospect, this meeting may be regarded as a turning point where computer conferencing changed from being an interesting curiosity to a small in-group to becoming a significant new force in the teleconferencing area. The next section of this paper, which reviews applications of computer conferencing, may indicate why many feel that this service has evolved to this point.

APPLICATIONS OF COMPUTER CONFERENCING

Crisis Management

The initial value of computer conferencing was shown during the Nixon wage-price freeze. Subsequent experience has illustrated that crisis management is a significant application of computer conferencing. The Emergency Preparedness organization has used this system for other urgent occasions:

> "This system, RIMS, in its various stages of development has been used in a number of emergencies, including the 1973 threat of interruption of service on the Pennsylvania Railroad, the 1974 nationwide strike of independent truckers, and the energy shortage." (13)

While these uses developed from man-made crises, similar co-ordination value would exist during natural crises. The asynchronous mode of message handling would ensure continuing communications with officials who might be out of contact for long overlapping periods and still have a need to communicate. Clearly, computer conferencing would be a supplement, not a replacement for voice communications during these periods. The widespread availability of acoustically coupled terminals and telephone service would facilitate this use of computer conferencing during crises.

Remote Joint Authorship

The joint preparation of memos, reports, papers, books and so forth by authors who are geographically separated is a time consuming and troublesome undertaking. Normally joint authors must rely upon physical meetings, the mail, telephone, or in rare cases, facsimile, for document preparation. Computer conferencing, especially when combined with various text preparation and editing systems such as the Augmentation system, provides a powerful new tool to authors. The asynchronous ability to prepare new material, debate various points, and prepare a final typed document from the terminal is an exciting possibility for many authors. The SRI Augmentation system designers call this process "collaborative dialogue". Their computer conferencing system with its integration to the wider Augmentation service is designed for this form of joint document preparation.

Information Sharing

COMPUTER CONFERENCING: AN OVERVIEW

The preparation and dissemination of scientific and technical information (STI) is an area that has attracted widespread attention in science policy research in the past decade. STI distribution is regarded as one of the key links in the innovation chain. This is true on both a micro (within a corporation) and macro (international technology transfer) basis. The advent of computer conferencing provides the opportunity to share information on a wide scale basis. This can be either formal data from structured information systems or informal sharing of ideas, opinions, and information in an "invisible college" of peers. Computer conferencing is especially adept at augmenting the second process.

Invisible colleges are groups or individuals who are known to each other and are working in a common field. This peer group process has usually maintained contact in the past by letter writing, the preparation of journal papers, telephone calls, and through face-to-face meetings at various conferences. Individuals are members of these groups only as long as they are recognized contributors to the field. Information is shared on a quid pro quo basis and non-contributors are quickly frozen out of the information loop.

Computer conferencing enables the invisible college to expand its membership geographically as well as maintain a more up-to-date flow of information between the members. A recent computer conference was sponsored by the Bell Canada Business Planning group for the purpose of augmenting a particular invisible college. This conference used the IFTF FORUM system and focussed on the topic of future substitution of communications for travel. Over 40 participants in three countries (Canada, the U.K., and the U.S.A.) exchanged more than 500 messages in two weeks and have agreed to follow up this activity with a series of "mini" computer conferences on particular substitution sub-topics of interest. This conference was also sufficiently useful to warrent publication of a transcript of its dialogue by the Business Planning Group and the Institute for the Future for consumption on a wider audience interested in the topic. The basic topic area, travel/communications substitution, is new to significant organized research (about 5 years old) and one of the enthusiastic reactions to the computer conference was the feeling that this had to be one of the first times that researchers in a new area could undertake continuing cooperation with such a large number of geographically distributed participants.

This form of "electronic invisible colleges" on an

international scale will very likely develop into one of the most productive uses of computer conferencing.

Conflict Resolution

One of the human problems associated with conflict resolution is that personalities, hierarchial position, and emotional attitudes often stand in the way of the "logical solution". The use of computer conferencing with its anonymous input capability and reflective (ie. self editing and typing time constraints) permits the frank but less emotional discussion of various issues. This impersonal forum removes some of the "threats" associated with normal human interaction. Individuals can try out "dumb" ideas without fear of their judgment being questionned by superiors or subordinates. Multi-organization dialogue is also possible witnout the department or institution becoming locked to a fixed position before all alternatives are considered. This approach is not negated by the fact that may final decisions will be made on an authoritarian or political basis. The free dialogue that occurs before a final decision is made may improve the quality of those types of decisions as well.

Taboo Discussions

It should be noted that while computer conferencing can filter out many of the emotional elements in a conflict resolution situation, it can also be used to discuss emotional issues as well. Experienced users of computer conferencing have become adept at transmitting both their emotions and their personalities via this medium. This has led some to suggest that computer conferencing could be used in sensitivity sessions or psychiatric sessions. (14) The anonymous input capabilities would enable individuals to discuss hidden feelings or desires without fear of personal censure. Discussions of "taboo" topics such as sexual attitudes is quite feasible with computer conferencing. Successful experience with computer assisted medical diagnosis systems where the patient interacts directly with the computer is an indication that computer conferencing may also also have a future in medical applications.

Policy Research

The original impulses to develop computer conferencing came from Delphi research. Delphi is one method of conducting policy research through the interrogation of inputs. One could easily foresee situations where organizations and institutions

would maintain rosters of experts on various topics who would be consulted or invited to participate in various debates via computer conferencing. This process would be easier to manage and the asynchronous feature make more productive use of the experts' time than face-to-face meetings or other forms of teleconferencing. This would be especially true in areas where little time was available for the assembly of the input of expert opinions to the policy making process.

Specific Applications

This review of generic application types may appear too general to some readers. Turoff has provided a wide range of specific suggestions in his ICC paper that reveals the potential of this service if one's imagination is put into play. His suggestions include:

"A group of salesmen involved in marketing a line of technical equipment such as computer peripherals maintains a continuous conference for the purpose of comparing responses to customer questions and analyzing competitive products.

The division heads in a company which is spread out geographically discuss and agree on their respective responsibilities for a company proposal involving their separate operations.

Several medical doctors representing differing specialties in a local area maintain a computerized consulting and referral network.

Technical librarians in a group of non-competitive companies set up a document exchange program and jointly plan complementary acquisitions.

A decision maker directs his subordinate managers to discuss anonymously a set of competitive alternatives for budget allocation among some of the divisions they represent.

Automobile service managers for a given manufacturer maintain a conference concerning the merits and performance of test and maintenance equipment, or concerning unusual servicing problems.

The manager of a decentralized development effort uses computerized conferencing to maintain with his group the status of his various projects and their current specifications.

COMPUTER CONFERENCING: AN OVERVIEW

A committee which meets regularly only once a month uses computerized conferencing to maintain continuous contact and to arrive at the agenda for its face-to-face sessions.

Uses by Deaf as a conference phone type system.

Use by home-bound handicapped to remotely participate in educational courses.

An author of a technical paper discusses it with a group of referees via an anonymous computerized conference.

Members of legislatures caucus at will with a computerized conference.

Policy makers obtain quick response on the pros and cons of critical issues from consultants scattered around the country.

A computerized conference is used for negotiations among non-anonymous labor and management people and several anonymous arbitrators.

Teenagers maintain an anonymous conference on dating customs and problems.

A college student taking a course in anthropology participates in a role playing conference simulating a primitive society.

A housewife joins a local conference discussing current affairs.

A stamp or coin collector joins a regional conference for the purpose of arranging trades.

A family joins in a simulation of planning for the local area as an evening's form of entertainment.

Students conducts an anonymous conference with their teachers to discuss various problems and subjects in a course.

Topic oriented "blind dating" conferences are maintained to help people of similar interest to find one another.

Delphi designers maintain a continuous conference to compare notes on current work in the field. A revitalization of the effectiveness of "hidden" research communities.

Multi-Language Conferences with human translators on-line to

do real-time translation. Certainly more feasible than computerized translation." (15)

Applications: Summary

The above categories of computer conferencing applications illustrate some of the ways that this service can be used in an organization or between organizations. There are broader implications for computer conferencing on an international scale. The following section reviews some of these international impacts of computer conferencing. In several of these specific cases, the international impacts cut across one or more of the applications categories discussed above.

However, he wants to develop a model of world energy problems utilizing experts in North America and Europe. He is using a modified computer conference system available on an international time-sharing network. This system will permit joint collaboration on defining inputs to the model as well as the development of the model itself. This form of international cooperation would likely be impossible or too time consuming using normal forms of communications or face-to-face contact.

International Policy Determination

The value of computer conferencing for crisis management has been reviewed. These benefits exist on an international basis as well. The value is for more than short term crisis. One of the Stockholm papers by Kupperman and Wilcox of the U.S. Arms Control and Disarmament Agency discussed how computer conferencing could be used in international negotiations. The use of a technique such as computer conferencing for international policy determination and conflict resolution certainly makes the technique a valuable addition to the family of communications services. The authors note the significance of this in their conclusions:

> "..., it is clear that computer conferencing can assist materially in preventing international conflict and resolving differences among nations. By contributing to understanding between nations with different value systems, computer conferencing can assist the participants in perceiving each other's interests and intents correctly, and in generating valuable statements of principle. Coupling traditional techniques of analysis with computer conferencing methods can thus form the basis of a common meta-language to bring international agreements to a new level of clarity, based upon a single image of evolving 'reality' which each side has helped to generate. Surely there can be no finer application of computer conferencing than to the deterrence of war and improved understanding among nations." (17)

Rome Futures Conference.

Computer conferencing received unique recognition at the Special Rome Conference on Futures Research in October 1973. This Conference was attended by individuals from both the industrialized world and the Lesser Developed Countries. It was directed towards establishing linkages between worldwide human needs, new societies, and the required supportive

INTERNATIONAL APPLICATIONS AND IMPACTS (16)

Technology Transfer

Sharing of scientific and technical information on an international scale has been one of the principal topics of discussion in international trade and foreign aid research. The main philosophy of technology transfer is summarized in the old parable that it is much better to teach a man to fish than to give him a fish to eat. The transfer of knowledge or technology can take place on a formal basis such as the licensing of patents or on an informal basis such as the presentation of technical papers at various conferences. Multinational corporations or organizations are often the agents of technology transfer.

Computer conferencing is a potential tool for technology transfer on an international scale. It can act as a form of electronic publishing and electronic mail to transfer technological information between countries.

International Collaboration

The capabilities of computer conferencing for joint authorship and information dissemination were discussed above. This has a special importance on an international scale, particularly for scientists in the Lesser Developed Countries. In many cases the leading scientists in Lessor Developed Countries leave their home countries in order to carry on research with their peers in the industrial countries. This is often not an issue for greater personal renumeration or better physical facilities, but a desire to work with the leading researchers in the field in question. It is a need to be a recognized contributor member of the invisible college and to have access to the latest data on the topic.

Access to a computer conferencing network which had an on-going series of conferences on the scientist's areas of interest would enable him to become a member of the invisible college without leaving his home country. This would be of benefit to the scientist and his country while still permitting him access to the information he needs to conduct his research on a professional manner. It also enables the researcher to obtain the necessary ego reinforcement from his peers without physically joining them at a foreign location. One example of a computer conference based upon international collaboration is an energy modelling project currently underway. The chairman of this project resides in Japan.

technologies. The conference was a week long dialogue on various issues, including the need for continuing communications on these topics between the various world futurists researching future problem areas and potential solution sets. At the end of the week, the 160 participants were asked to vote on 15 proposals developed by working groups. The voting weighed both the "importance" and "practicability" of these proposals. The communications group proposed the establishement of a futures oriented international computer conferencing network:

> "At present remotely located groups are unable to confer with each other on vital common issues, eg., villages on farming plans, futurists on world population growth. A task force should undertake the development of a multi-media network which includes progressively cassettes, videotapes, and ultimately a two way real time interactive, computer augmented conferencing network available to all groups in the world interested in the study of problems of the future on a continuous, ie. when wanted basis. The appropriate sponsor is the World Federation of Futures Studies with UN and/or Foundation support. Full time professionals would be required. The project should begin as soon as possible so that international operation would be affected within four years.
>
> As demonstrated by the conference, communications are not working as well as they should be; remotely located potential participants are absent and communications between successive meetings have been lacking. There are many uses for the same network. The technology is available today and analogous networks are now operating, eg., a worldwide weather reporting system is available to all airports and used in all countries since the 1960's. The proposed concept can in fact use existing networks in many areas at a cost of $10 per hour or less". (18)

The assessment of the conference participants indicated that these futurists felt that the computer conferencing proposal was of the highest importance and practicability. It was tied with the proposal for the development of a "new human rights framework" as the most desirable of the 15 proposals presented at the conference. It is significant that a group of non-communications specialists meeting on a topic as broad as world problems picked computer conferencing as one of the most important tools for futures research and planning to assist solving major world problems. The beneficial capabilities offered by computer conferencing appear to be recognizable by

a broad range of individuals after the concept is adequately explained.

Village Systems

Murray Turoff has proposed that computer conferencing could be used in Lesser Developed Countries for a wide number of routine activities in remote villages. He argues that computer conferencing systems based upon mini-computers could be made available for the equivalent price of a cheap truck. These systems could be used for a series of village applications:

Bid and barter conferences for various commodities both within the village and between villages.

Regional and local planning activities. Village members could participate in decisions that would have an immediate impact upon them ie. road building, public construction, etc.

Crop planning and agricultural data exchange.

Access to remote experts and specialists who could help solve local problems remotely. These specialists could, for example, aid village paramedics or teachers.

Government information exchange. The system can be used by government officials to distribute information to local leaders and obtain feedback from them.

Personal message transfer between villagers. (19)

One of the Nigerian speakers at the IFIPS and ICCC Stockholm conferences provided a supporting analysis. He noted that many underdeveloped countries are currently planning and installing their first nationwide telephone systems. It would be shortsighted for their planners to merely duplicate the systems available in the industrial nations. Existing telephone systems have been designed for voice communications and only used after the fact for computer communications. The speaker argued that the Lesser Developed Countries should design their new communications systems with computer communications applications also in mind. (20) If this philosophy is followed we may see the eventual development of new national communications systems which include computer conferencing features as a part of the overall communications service package.

COMPUTER CONFERENCING: AN OVERVIEW

International Applications: Summary

Computer conferencing shows promise of becoming a valuable communications tool on an international basis. It will be of value for both inter and intra organizational communications as well as serving a variety of needs in the Developing Countries.

ANALYSIS OF COMPUTER CONFERENCES: A CASE EXAMPLE

In addition to the straight forward data that can be obtained from a conference recorder, exploratory analysis to develop a methodology for assessing computer conferencing interaction and participation patterns has been undertaken by researchers at the Business Planning Group of Bell Canada , The Institute for the Future, and the Stanford Research Institute.

In the analysis of the Travel/Communication Tradeoffs Conference , James Kollen at Bell Canada developed a series of content categories that tap such conference dynamics. The frequency of each category can be plotted over time to show the evolution of the conference more specifically. Also, the social dynamics of the conference can be summarized and analyzed with some precision (see Chart 1).

A major problem which arises here, as with participation rates, is the definition of a basic unit of communication. Each FORUM message is determined by a particular conferee and may actually contain several different content categories within it. Thus, the content categories should not necessarily be structured around the discrete FORUM entries.

Gwen Edwards of the Stanford Research Institute was also concerned with defining FORUM entries and she also found that the computer definitions were inadequate for analytic purposes. While her analysis focused on interaction patterns, ie. the responsiveness of participants in the computer conference regardless of the subject matter of the particular entry, she found that some concern for content was necessary in order to help define when one "entry" ended and a new one began. These two independant analytic efforts of Kollen and Edwards led to an exchange of information and ultimately to a collaboration between the two approaches.

The central research question which underlies Kollen's analysis is how communication varied in that conference, and what significant patterns of communication can be delineated. In general, two types of communication were investigated - participation and, in conjunction with the Edwards' analysis, interaction. The former refers to an analysis of content verbosity while the latter attempts to measure person-to-person responsiveness within factors of discussion.

This research indicated that interaction and participation as concepts possess a great deal of face validity as measures of conference dynamics. Empirically, in this conference the

correlations between interaction (Factor Interaction Ratio) and participation (Factor Participation Weight) are quite low. This finding indicates that the two indices do indeed represent 2 major and separate measures of conference dynamics. When multiplied together we are tapping the combined effect of participation and interaction (Factor Effect Index).

These terms are defined in the following fashion:

(Factor Participation Weight) x (Factor Interaction Ratio) = Factor Effect Index

1. Factor Participation

   This is the number of words per Factor.

2. Factor Interaction

   The Factor Interaction Ratio is the ratio of the number of person-directed messages and the number of undirected messages which received responses, plus the number of responses to such stimuli over the total number of directed and undirected messages sent within each factor.

3. Factor Effect Index

   The Factor Effect Index measures the interactive effects of verbosity within each Factor as indexed by the Factor Participation Weight and the degree of interaction within each Factor as tapped by the Factor Interaction Ratio.

4. Relative Factor Weight

   This index measures the relative contribution of each Factor to total conference participation and interaction. (21)

The basic analysis is shown in Table 1. It is interesting to note that equal contributions to regulatory content remarks were made by the chairmen (Johansen and Kollen) and the other participants. This indicates that for the most part the conference was self-regulating in nature.

When considering the Factor Participation Weight and Factor Interaction Ratio columns, it becomes apparent that both the participation and interaction measures were substantially greater in the Object Related Factor than in the other factors of discussion. This is reflected in the very high scores in

the Factor Effect and Relative Factor Contribution columns. Indeed, 70% of conference participation and interaction occurred within this factor. On the otherhand, the low scores of the Regulatory and Irrelevant/Equivocation Factors reflect their relatively low contributions to conference effect.

More specific patterns of differential Factor Effects which are masked in the aggregate table can be revealed when participation and interaction measures are plotted over time. Such an analysis should reveal that the Regulatory and Irrelevant/Equivocation Factors exhibit highly significant effect scores at critical points in the conference's growth curve which are washed out when conference effect is viewed from a macro level.

A second approach to thread analysis of conference transcripts was developed by Gwen Edwards of Stanford Research Institute. Rather than concentrating on topic threads over time, Edwards observed interactive patterns, ie. threads of dialogue and discussion. Table 2 shows the categories which she established, with the basic distinction being between person-directed and group-directed comments. By following the threads of these comments over time, she was able to see the kind of comments that prompted the longest interaction and the type of interaction which occurred.

Edwards noted the significance of this approach when she wrote:

> "Traditionally, the occurrence of 'interaction', i.e., dialogue, has been assumed from data showing to whom and from whom messages have been sent. However, no apparent attempt has been made to determine which messages sent (and, by definition, received) actually recieved responses. The new computerized interaction analysis systems likewise do not distinguish between messages sent and messages eliciting responses (a distinction ultimately content dependent). Although Forum file statistics for messages sent and received were available, these statistics of entries sent and retrieved were believed to be insufficient for an analysis of response. It was curiosity about actual responsiveness of the computer conferencing medium, especially since the medium allows persons to communicate asynchronously, that prompted this analysis.
>
> ...
>
> Underlying the analysis are at least four basic research

questions, all related to the process of participant interaction:

(1) Did participation vary? If so, how? Can any significant patterns of participation be determined?

(2) Was the system responsive in terms of interaction? Was the interaction primarily dyadic or group? What might the human factors be for eliciting a response?

(3) In what way did the private message capability affect the quality and the quantity (free flow of ideas) of interaction?

(4) Is there a relationship between the number of contacts within the group an individual had prior to the conference and his or her level of participation in the conference?" (22)

This analysis determined that while information was not derived from existing data to sufficiently answer all the research questions, a methodology to approach these questions was developed.

First, individual rates of participation were plotted from which it was determined that a small group did in fact dominate the conference proceedings (Chart 2). The interaction patterns of the top six participants were also studied to determine the extent to which this group dominated the interaction (Chart 3).

Time, as a function of interaction was also investigated, specificaly the time delay between an inquiry and its response. Determining the relationship between length of delay and responsiveness was believed to be especially important in asynchronous conferencing. One surprising finding in this analysis was the tendency for directed messages to receive a response within 20 minutes from time of initial inquiry or not at all. Even though the time delay between messages and responses was somewhat greater for the undirected messages, the work of Edwards still posed as a question for further research , how well can individuals "interact" asynchronously?

The analysis by Johansen of IFTF revealed the flow of this particular conference from a statistical perspective. This is illustrated in the accompanying two charts. Chart 4 indicates how the conference discussion fluctuated over time. The 1st

week of the conference was devoted to solving the "learning curve" problem inherent in using the new medium. The drop in the middle of the conference represents "down time" caused by network difficulties and the weekend holiday period. Finally, as the discussion accelerated the conference came to an abrupt and premature end because of computer problems. Chart 5 in this set illustrates the participation of many of the conference members on two different scales: number of public and private messages and average length of messages. This form of "mapping" can reveal much about the form of the conference at a short glance. (23)

Other types of analysis of computer conferencing interaction are being conducted . A ICC paper by Conrath and Bair analyzed the form and types of communications that have occured on the Augmentation system using the various conferencing capabilities. (24) Their analysis cannot be discussed at length here but it is recommended to readers who are interested in pursuing the subject in more depth. They discovered that the use of computer conferencing in the subject organization resulted in the substitution of an unexpected level of telephone traffic and generated more messages upwards in the hierarchy (more than one level upwards) than in a similar group that did not have access to computer conferencing. The basic conclusions of their paper were:

> "While the reasons for the apparent substitution effect are not entirely clear, we can offer three that are consistent with other observations. The first two are a direct result of the augmentation aspect of the AKW [Augmented Knowledge Workshop], as it provides communication characteristics that do not readily exist elsewhere. One, the AKW provides for a delayed time interaction. One can contact another whether or not the other is at his workspace, knowing that when he does arrive he will be aware that a message is waiting for him. Thus, one has something like a real-time mail service, but with the knowledge that the delivery will take place only when the other party is at home. One can avoid the frustration of telephoning and getting no answer.
>
> Two, the AKW, since it is computer memory based, can record all of the interaction that takes place. In contrast to face-to-face conversations, when it is often difficult to get two parties to agree on what has been said, the AKW can provide a complete transcript. This is especially useful when one recognizes that the dialogue that he is conducting now will provide the basis for further dialogues.

Three, apparently the use of the CRT and the AKW gives the system an element of the personal touch. The users perceive the system as providing a means for personal interaction, and hence the system does not inhibit the kind of communication that might take place among the more personal modes, such as face-to-face or telephone. The reason for this effect is not well understood and deserves further research, especially considering the potential impact.

Based on other data, the AKW appears to have been a preferred mode for upward flowing traffic. Subordinates felt more at ease contacting their superiors via the computer than calling them or walking into their offices. Perhaps augmentation technology provides a personal and yet unobtrusive means for bridging the difficult communications link between subordinate and superior." (25)

CONCLUDING COMMENTS

This final section of the paper reviews some of the authors' opinions regarding the potential future of computer conferencing. These opinions have developed over several years and have resulted from hands-on experience with each of the systems described above as well as from continuing discussions with the developers of these systems. The strengths of computer conferencing have been elaborated in the previous sections. Hence, some of these remarks will be addressed towards some of the potential weaknesses.

Forced Feeding

One problem area could be termed "forced feeding". Initial exposure to computer conferencing often results in enthusiastic acceptance. An individual may start up a series of conferences with his colleagues and experiment with the various system capabilities. Most of the message content is often concerned with the conferencing system itself rather than any substantive issues. This initial excitement soon wears off and the system becomes used very little. In other cases, the new users try to conduct a series of substantive conferences and become disillusioned if great progress is not made. The disuse of the system soon follows here as well.

In both of these instances, the users tend to ignore the fact that computer conferencing is only an additional communications tool, not a panacea. If you have nothing important to communicate with other individuals beyond how much fun the system may be, this is certain to wear off. A communication system cannot stimulate continuing interest and message transfer if there is very little to say. On the other hand, forcing the system to do too much is also a mistake. Other means of communications are needed as well in order to meet the vast variety of communication's user needs. For example, "linking" is a very useful device to ask questions, transmit short messages, or learn how to do something new. However, attempts to carry on long "conversations" via a link can be tedious and time wasting. The author often will break off a link with the comment that the discussion requires a phone call and place that call rather than waste both party's time on the link. Some system designers have recognized the frequency of this instance and are considering joint voice/computer conferencing teleconferencing systems. Hence, users must be aware of the dangers of becoming oversold on computer conferencing or any other single teleconferencing tool.

COMPUTER CONFERENCING: AN OVERVIEW

System Complexity

The ease of learning how to use the available computer conferencing system varies between systems. As a rule, systems that are easier to use do not offer as wide a range of specialized capabilities. Thus, the system designers have conducted trade-offs between ease-of-use and the range of available user features. Generally, the Turoff and modified Turoff type systems offer a wide range of features. However, the user must memorize a series of codes or consult a user guide in order to use the system to its full advantage. The FORUM system is easier for the novice to learn how to use but does not offer all of the specialized features of the Turoff approach. The Augmentation system requires an intensive training investment for the user. However, this is knowledge on how to use the entire system rather than just the computer conferencing package which is relatively easy to use. In the latter case, the combined power of the Augmentation system and its computer conferencing module makes this approach attractive for some uses.

A related issue is that of standardization. This is, of course, a common problem in the computer and communications fields. Each of the computer conferencing systems requires the user to learn a different set of commands and protocols. The user who has access to all of these systems often finds it difficult to keep them all separated in his mind. This reinforces the need for good prompting features in a computer conferencing system.

Regulatory/Legal Issues

The FORUM and Turoff systems are now available on several commercial time-sharing networks. The Augmentation system is also available as a "utility" package from the Stanford Research Institute. To date, the SRI has been used by military and research organizations with the Business Planning Group being the only industrial participant in this extended experiment and development process. More industrial users can be expected for new phases of this system (dubbed "OFFICE-1") in the near future.

The movement of computer conferencing from a research vehicle to a commercial service is bound to raise some regulatory/legal issues. Is this a computer or a communications service? How should it be regulated, if at all? Can communications common carriers provide computer conferencing as a part of their regular service package? These

and many other issues will have to be resolved in the next few years. It is likely that the precedents will be established in the immediate future with the regulatory delay process resulting in longer term answers to the institutional issues. As Turoff noted in his ICC 74 paper:

> "The ultimate impact in any country will depend upon the decisions of various governmental and regulatory bodies who are structured along organizational lines that are increasing becoming antiquated in terms of the decisions they will have to face if these systems are to function for the good of the society as a whole." (26)

Privacy

Privacy issues have been the subject of vigorous debate for the last decade. The reader is undoubtedly familiar with the general directions of this debate and they will not be summarized here. However, in addition to the legal privacy issues, there are ethical and interpersonal behavior questions of privacy as well. For example, how should the transcripts of computer conferences be handled? Many individuals would protest the distribution of tape recordings of their discussions to an audience outside of the initial conference group. Similar feelings may exist in many cases for computer conferencing outputs. Participants may want prior approval or censorship veto rights before transcripts of computer conferences are distributed.

The author has also learned that new habit patterns have to be developed during linking. For example, when the user links to another system user, he should tell the linked party immediately that there are are third parties involved in the link or that this link is part of a demonstration. Failure to do this can result in embarassing comments being sent via the conference. There is no way of retracting or hiding these statements once they have been sent in a synchronous link. Hence, minor changes in communications conventions are required to avoid these and similar types of problems that can arise through the use of computer conferencing.

Continuing Development

System designers would all admit that the existing computer conferencing systems are in need of considerable improvement. They are first generation tools. New systems will have to be developed. Specialized conferencing packages can be envisaged for various types of users: lawyers, medical workers,

teachers, the handicapped, scientific specialists, and so forth. These systems should be developed in multiplicity at a number of locations (the question of standards can still be resolved via this route). The innovation process is still too young for computer conferencing to be forced into any particular mold at this time.

Much of this work is still at basic research stage. It is unlikely that significant commercial funding will be available to independent organizations developing computer conferencing. Existing systems have been developed through funding from government agencies such as the National Science Foundation and the Advanced Research Projects Agency. Similar future support from these and other agencies is the most likely means of continuing the current level of development. The danger is that the field is not particularly "glamourous" and it may get lost in some of the larger trade-offs that often must take place in funding agencies. It is hoped that this will not occur since, on the balance, computer conferencing offers much promise as an emerging communications tool.

CONCLUSIONS: THE FUTURE

Computer conferencing appears to have a bright future. It will benefit from the continuing drop in communication costs, the development of new packet switched common user communications networks, widespread availability of cheap, portable terminals (perhaps integrated with T.V. sets), and cheap mini computer based systems. The main task for designers of computer conferencing systems will be to develop simple, user oriented (often user-specialized) conferencing packages that will be widely available on a national or international basis. System evaluations, such as those shown above, will be required to guide the system designers. This synthesis approach will help ensure success for the evolutionary growth of computer conferencing.

FOOTNOTES

1. Andrew J. Lipinski, Hubert M. Lipinski, Robert H. Randolph, "Computer-Assisted Expert Interrogation: A Report on Current Methods Development,"in Stanley Winkler(ed.), Computer Communication: Impacts and Implications, Proceedings of the First International Conference on Computer Communications, Washington, D.C., Oct. 1972, p. 150.

2. James H. Kollen and Jacques Vallee(eds.), Proceedings of the First International Computer-Based Conference on Travel/Communication Relationships, Business Planning Group, Bell Canada and The Institute for the Future, Montreal, Quebec and Menlo Park, Calif., July 1974.

3. Murray Turoff, "'Party-Line' and 'Discussion' Computerized Conference Systems", In Stanley Winkler(ed.), Computer Communication: Impacts and Implications, Proceedings of the First International Conference on Computer Communications, Washington, D.C., Oct. 1972, p. 161.

4. Ibid., p. 163.

5. For information on the initial EMISARI system see : Robert H. Kupperman and Richard H. Wilcox, "EMISARI: An On-line Management System in a Dynamic Environment", in Stanley Winkler(ed.), Computer Communication: Impacts and Implications, Proceedings of the First International Conference on Computer Communications, Washington, D.C., Oct. 1972, pp.117-120.

6. N. Macon and J.D.McKendree, "Emisari Revisited: The Resource Interruption Monitoring system", Proceedings of the second International Conference on Computer Communications, Stockholm, Sweden, August 1974, p. 91.

7. Murray Turoff, "Computerized Conferencing and Real Time Delphis: Unique Communication Forms", Proceedings of the Second International Conference on Computer Communications, Stockholm, Sweden, August 1974, p. 142.

8. Roy Amara and Jacques Vallee, "Forum: A Computer-Based System to Support Interaction Among People",in Information Processing 74, Systems for Management and Adminstration, IFIP Congress 74 Preprints (Vol. 5), Stockholm, Sweden, August 1974, p. 1053.

9. H. Lipinski and R.H.Millar, "Forum: A Computer-Assisted Communications Medium", Proceedings of the Second International conference on Computer Communications, Stockholm, Sweden, August

1974, pp. 143-144. Further information on the Forum system can be obtained from the Institute which has produced a series of reports describing and evaluating it.

10. Douglas C. Engelbart, Richard W. Watson, and James C. Norton, "The Augmented Knowledge Workshop", National Computer Conference Proceedings, AFIPS Press, Montdale, N.J., June 1973, p.9.

11. Ibid., p. 14.

12. Ibid., pp. 14-15.

13. Macon and McKendree, p.89.

14. Turoff has suggested this in several of his papers.

15. Turoff, "Computerized Conferencing...", pp. 139-140.

16. Some of the material in this section was discussed by the author in a paper presented at the MEXICON 74 conference : Lawrence H. Day, "The Impact of Computer Conferencing on Less Developed Countries", MEXICON 74, Mexico City, Mexico, August 28, 1974.

17. R.H. Kupperman and R.H.Wilcox, "Interactive Computer Communications Systems-New Tools for International Conflict Deterrence and Resolution", Proceedings of the Second International Conference on Computer Communications, Stockholm, Sweden, August 1974, p. 471. The authors have also prepared (with Harvey A. Smith) a paper on this subject that has been published in Science ("Crisis Management--Some Opportunities", Science, Vol. 187, Feb. 1975, pp. 404-410).

18. Harold A. Linstone, "The Working Groups: A Focus on Action" in Human Futures: Needs-Societies-Technologies, Futures, IPC Science and Technology Press Limited, Guildford, Surrey, U.K., 1974, p. 163.

19. Murray Turoff, "Potential Applications of Computer Conferencing in Developing Countries", Proceedings of the Special Rome Conference on Futures Research, Istituto Ricerche Applicate Documentazione e Studi, Rome, Italy, 1974.

20. Remarks made at both the IFIPS and ICC 74 Conferences by J Fagbemi of Nigeria.

21. James H. Kollen, internal memo, Business Planning Group, Bell Canada, Oct. 1974, (Note: the material referenced in this and the

following two footnotes is being combined into a joint publication of the Business Planning Group and IFTF entitled: Group Communication Through Computer Conferencing: An Analysis of the First International Computer-Based Conference on Travel/Communication Relationships.)

22. Gwen C. Edwards, Group Communications Through Computer Conferencing: An Analysis of Interaction, Telecommunications Sciences Center, Stanford Research Institute, Menlo Park, Calif., June 1974, pp. 1 & 4.

23. Institute for the Future, Proposal for Extended Field Testing of Computer Conferencing: An Investigation of Social, Managerial, and Economic Issues in Computer-Based Communication, Prepared for the National Science Foundation, Institute for the Future, Menlo Park, Calif., Oct. 1974.

24. D.W.Conrath and J.H.Bair, "The Computer as an Interpersonal Communication Device: A Study of Augmentation Technology and Its Apparent Impact on Organizational Communication", Proceedings of the Second International Conference on Computer Communications, Stockholm, Sweden, August 1974, p. 125.
Similar findings to those of Conrath and Bair were reported by the head of the ARPA agency when he analyzed his own message traffic on the ARPANet: Stephen J. Lukasik, "Organizational And Social Impact of a Personal Message Service", Proceedings of the National Telecommunications Conference, IEEE Communications Society, San Diego, Calif., Dec. 1974.

25. Ibid., p. 125.

26. Turoff, "Computerized Conferencing...", p. 142.

COMPUTER CONFERENCING: AN OVERVIEW

(J32785) 19-JUN-75 05:35;;;; Title: Author(s): Inez M. Mattiuz/IMM;
Distribution: /LHD([INFO-ONLY]) ; Sub-Collections: BELL-CANADA;
Clerk: IMM; Origin: < MATTIUZ, CC/OVERVIEW.NLS;1, >, 19-MAY-75
10:29 IMM ;;;;; ####;

DLS 19-JUN-75 07:54 32786

Further IMLAC Problems Under 133

1 Some other inconveniences and problems we have using DNLS with the IMLAC's and 133. 1

1a On entering NLS (having used the TENEX command term 1V), one has to hit ^6 to determine when the screen is starting to be filled, then ^6 ^7 ^o ^6 ^7 to terminate the startup branch. A similar sequence is necessary to terminate a file being transmitted to the line printer under Output Remote. 1a

1b One can only get the system load by hitting ^6 ^7 ^(and shift)t ^6 ^7. Just ^t will not work. 1b

1c One cannot insert control characters in the normal manner using the ^v escape character. For example ^o is always echoed (and inserted in the file) as <CA> assumes a variety of shapes, as I will now demonstrate...%d%X+< %d&H(4 %d'X(0 %d%T+< %A%_+R %A%\+H....had enough? This happens regardless of whether I use the mouse <CA> button, the keyboard <CA> key or ^d. The way to get a control character into text is to hit ^v ^7 ^character ^7 TYPIN/. 1c

1c1 It is interesting to note that when one Goes to Tenex and forgets to hit the ^7, the <CR> and <CA> buttons echo ^/ and the command is not recognized. 1c1

2 I have not followed the dialog closely on page width and length at TENEX (I've been on jury duty this week). The wrap around of the two characters followed by the
** occurs with both MESS and LINK. 2

2a Incidently, when one types in a literal carriage return as I just did, there is no <LF> in the typin window, which means that a line of text is overlayed. It makes it into the file OK, but its hard to see if you have made typing errors. 2a

3 The MESS command does not stop at the end of a message and ask if you want to see the next one (as it used to). It seems that it should stop every 30 lines or at the end of the message (which ever comes first) for it to be more than marginally useful. We can only use it now as a rough screening device (when the net or Office-1 is loaded), to see if it is worth while letting the startup branch Move Message. 3

DLS 19-JUN-75 07:54 32786

Further IMLAC Problems Under 133

(J32786) 19-JUN-75 07:54;;;; Title: Author(s): Duane L. Stone/DLS; Distribution: /FEED([ACTION]) JCP([ACTION]) JDH([ACTION]) EJK([INFO-ONLY]) RJC([INFO-ONLY]) JPC([INFO-ONLY]) RBP([INFO-ONLY]) ; Sub-Collections: RADC; Clerk: DLS;

PWO 19-JUN-75 08:27 32787

journal receipts

1 Sandy, I have received no journal items from you and suspect that something is wrong with my mailbox. However I have received a few scattered items, one from dvn and one from kirk. Let me know if you come up with anything. 1

journal receipts

(J32787) 19-JUN-75 08:27;;;; Title: Author(s): Pat Whiting O'Keefe/PWO; Distribution: /SLJ([ACTION]) DVN([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: PWO;

EJK 19-JUN-75 12:09 32789

format-sole-source

Note: The format is only one page long, but the directives will take care of as many pages as your statemnt will need

format-sole-source

1 This is the first statement you should copy. 1

PR-B-6-0000

SOLE SOURCE STATEMENT

"YOUR JOB TITLE"

BACKGROUND: Recently several of us have had to prepare Sole Source Statements for procurement. Those people who put their work into an NLS file frequently do not know how to use the Output Processing Directives properly. This results in a lot of trial and error and frustration. The directives in this file all work properly. Rather than try to do it yourself you might want to copy this file into your own directory and then edit it by replacing my text with your own text. To see how this looks with the directives output it to the printer or use the command OUTPUT TERMINAL to print it on your terminal.

OBJECTIVE: Replace this with your own text.

SOURCE: Your Company, Inc.
Street Address
City, St 12345

JUSTIFICATION: Replace this with your own text.

ACTION TAKEN TO AVERT SUBSEQUENT SOLE SOURCE: Replace this with your own text.

PAST PERFORMANCE: Replace this with your own text.

YOUR NAME
Project Engineer
Information Management Sciences Section
Information Processing Branch

FRANK J. TOMAINI, Chief
Information Processing Branch
Information Sciences Division

EJK 19-JUN-75 12:09 32789

format-sole-source

(J32789) 19-JUN-75 12:09;;;; Title: Author(s): Edmund J. Kennedy/EJK; Distribution: /RADC([INFO-ONLY]) ; Sub-Collections: NIC RADC; Clerk: EJK;

1 32789 Distribution

1a William E. Rzepka, Rocco F. Iuorno, Thomas J. Bucciero, Roger B. Panara, John L. McNamara, Joe P. Cavano, Duane L. Stone, Marcelle D. Petell, Thomas F. Lawrence,

1b Samuel L. Ruple, Stephen P. Sutkowski, Richard Caliccnia, William W. Patterson, Francis J. Hilbing, Robert K. Walker, Frank P. Sliwa, Joe F. Femia, Roger W. Weber, Melville J. Draper, Robert D. Krutz, James W. Hyde, David T. Craig, Fred N. Dimaggio, Robert E. Doane, Robert J. Kenyon, Richard Nelson, William F. Stinson, Daniel R. Loreto, John B. McLean, Murray L. Kesselman, Edward F. LaForge, Agatha C. Deconde, Alan R. Barnum, Larry M. Lombardo, Anna A. Cafarelli, Roberta J. Carrier, Donna R. Robilotta, Richard H. Thayer, Frank J. Tomaini, Mike A. Wingfield, Edmund J. Kennedy, Ray A. Liuzzi, Donald VanAlstine, Deane F. Bergstrom, Frank S. LaMonica

DLS 19-JUN-75 12:35 32790

MULTICS Host at RADC

for the record

MULTICS Host at RADC

1 27-MAY-75 1037-PDT STONE: MULTICS Host at RADC Distribution: FEINLER AT BBNB, stone, lawrence Received at: 27-MAY-75 10:37:12 1

1a The host at RADC is on port 0. Its number is 18 (decimal). The name is RADC-MULTICS. The man to call is Robert Walker...315-330-2501...he should be in the journal Ident system. A list of ARPANET directory entries has been put together...will send in the journal today or tomorrow. Hang in there...

Stoney 1a

2 9-MAY-75 1757-EDT FEINLER at BBN-TENEXB: New Multics Host Distribution: STONE AT OFFICE-1, feinler Received at: 9-MAY-75 14:59:36-PDT 2

2a Dear Stoney, 2a

2b Is the new multics host on the network yet? If so could you let me know what it's hostaddress and name will be and who will be Liaison, etc. 2b

2c Have had reports that it is surfacing. Also where will it be located at Rome or elsewhere? 2c

2d Hope all goes well - swamped as usual here. 2d

2e Cheers, Jake 2e

DLS 19-JUN-75 12:35 32790

MULTICS Host at RADC

(J32790) 19-JUN-75 12:35;;;; Title: Author(s): Duane L. Stone/DLS;
Sub-Collections: RADC; Clerk: DLS;

DCE 21-JUN-75 18:17 32797

Reporting ELF-input hardware troubles

1 Working today (Saturday) in my office, with DNLS. Began getting severe "LP errors". Borrowed the LP that was plugged in to station #75 in the Commons (a Data Media terminal). Same troubles. Borrowed the Data Media CRT (Not Keyboad) from there -- same troubles. Then I went in to the ELF room and plugged my station line (#15) into ELF-input line #6, where station #75 had been plugged. Finally stopped having the troubles. 1

1a 1a

2 Current situation is that the old LP and DM CRT from station #75 are connected at station #15 in my office, and on through to Port 6 of the ELF, while my old LP and CRT are sitting unused in my office, the line from station #75 is dangling at the patch panel, and my old ELF-input port #1 is empty. 2

3 I guess that there is someting wrong with that ELF input port (#1)? A MEH problem, or whose? 3

Reporting ELF-input hardware troubles

(J32797) 21-JUN-75 18:17;;;; Title: Author(s): Douglas C. Engelbart/DCE; Distribution: /MEH([ACTION]) JCN([INFO-ONLY]) JCP([INFO-ONLY]) JLE([INFO-ONLY]) RAB([INFO-ONLY]) RCO([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: DCE;

LAC 22-JUN-75 08:04 32798

1 Jon, journal entries 32765 through 32767 are (should be) identical. The first two tries got aborted in mid-process, or at least that was how it appeared, so that is why there are three. The third is the only one which went to successful completion, so that should probably be considered te clean version. /Larry 1

(J32798) 22-JUN-75 08:04;;;; Title: Author(s): Lawrence A. Crain/LAC; Distribution: /JBP([ACTION]) NSW([INFO-ONLY]) ; Sub-Collections: NIC NSW; Clerk: LAC;

1 32798 Distribution
1a Jonathan B. Postel, Jan A. Cornish, Larry L. Garlick, Elizabeth J. Feinler, Kirk Sattley, Ronald P. Uhlig, James B. Lloyd, Frank J. Natoli, Peter C. Waal, Elizabeth K. Michael, William E. Carlson, Steve D. Crocker, David L. Carlstrom, Robert M. Balzer, Richard W. Watson, Lawrence A. Crain, Anthony A.L. Baggiano, Mike A. Wingfield, Jonathan B. Postel, Robert E. Millstein, Duane L. Stone, James E. (Jim) White, Albert J. Mayhan, Albert Vezza, Charles H. Irby, Eugene W. Stubbs, David L. Retz, Stephen T. Walker,

MIKE 22-JUN-75 11:22 32799

reminder that I need help with a BAD FILE <bedford>may15.nls;12

Last weekend I sent a mssage requesting help on this file; I'm surporised I haven't heard from you about it; I didn't want to bring it up first thing last week, and then it slipped my mind until I went to wrok on it this weekend.

MIKE 22-JUN-75 11:22 32799
reminder that I need help with a BAD FILE <bedford>may15,nls;12

1 (BEDFORD) 14-JUN-75 0824-PDT a file versions vanished before my very eyes !
Distribution: MARTINEZ, norton, feedback, mattiuz, day, bedford
Received at: 14-JUN-75 08:24:56-PDT 1

1a Last weekend (June 7-8) I did considerable work in <bedford>may15.nls;11;12. I printed a copy of the file sunday pm, and did not read or write in it until this morning (sat.)
The first thing I did in the file this morning was Print Statement A: may15,5a81 V:Xcm. This worked fine, and indicated that what I had done last weekend was still there.
I then did Print Statement A: .u V:<CA> , and it worked fine.
I then tried to Insert Statement (to follow) A:<CA> L:<CA>
T: Home Surveillance Systems<CA>
when I hit that last <CA>, i got a message illegal instruction executed, with a lot of numbers that would probably be useful to someone trying to figure out what happened; I don't know what they were.
Anyway, I got thrown out of NLS, and when I tried to get back to that file, I found that both versions (;11,12) did not have the latest (last weekend's) work in them.
1.) What happened ?
1.) Can you recover the on-line version of this file ? I have a printed copy, but it is not too useful since the file is a wraorkin document into which and from which I am copying dozens and dozens of statements fro other files every weekend.....(not to clear is that ?....the important ting is that I need it back). 1a

2 (BEDFORD) 14-JUN-75 0835-PDT Further to the lost versions query....time of last write looks okay.
Distribution: MARTINEZ, bedford, feedback
Received at: 14-JUN-75 08:35:05-PDT 2

2a I checked the date of last write for may15.nls;12, nd it turns out to be 11:00:00 on June 8, which is just about right. This would indicate to me that this is the right version, but that something happened to it this morning. Just as a further example, the plex at 5a1 should include 8 statements at that level; in fact it includes only 6, I think, and I notice that 5a2 is blank, while in version ;11 it is okay. It looks as if somethings sent through ans grabbed chunks ot of the file from here
nd there. Phil weintraub of our group has complained of things like this before, and I told him that things don't happenda like that; I told him that whole versions might go on you, leading you to think that you'd lost bits of the file from here and there, but that the intra-version integrity of the file was secure. Now I am doubting this. 2a

MIKE 22-JUN-75 11:22 32799

reminder that I need help with a BAD FILE <bedford>may15.nls;12

(J32799) 22-JUN-75 11:22;;;; Title: Author(s): Michael T. Bedford/MIKE; Distribution: /BOBM([ACTION]) IMM([INFO-ONLY]) FEED([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: MIKE;

1 References: 1

1a a. DTACCS Memorandum for the Telecommunications Council Members, dated 1 June 1975, Subject: AUTODIN II Phase I Program Memorandum and Guidance for Data Network Development. 1a

1b b. ARPA Memorandum to DTACCS dated, 9 January 1975, Subject: AUTODIN II, Integrated Data Network, Subsystem Project Plan 2-74. 1b

2 The following comments address the AUTODIN II Phase I Draft Guidance Memorandum provided to members of the Telecommunications Council for informal review and comments. Earlier comments on the ARPA position on AUTODIN II are provided in reference b. These comments reflect ARPA experience in the design, establishment, and check-out of the ARPANET as well as in the daily operation o the network and in the constant adaptation of the network to support new users and new requirements. 2

3 First, it is considered essential that DCA and the services gain first hand experience in the use of a computer-communications network before attempting to design and develop a new system with significant hardware and software differences from existing proven systems. The ARPANET, under DCA management, supplemented later by an AUTODIN II Phase I network incorporating proven ARPANE technology, should provide a useful test bed with which to gain this experience. Further work on end-to-end encryption, reliability, and host level protocols is also essential prior to major investments of funds in a new computer-communications network based on significant new hardware and/or software technologies. 3

4 Toward this objective, it is recommended that the AUTODIN II Phase I program be implemented along the lines outlined in Option 2 of Reference b. Briefly this option proposes the establishment of a separate DoD computer-communication network employing existing ARPANET technology (Honeywell IMP'S and/or PLURIBUS IMP'S) and utilizing end-to-end encryption to provide security. This option assures well established performance with a minimum implementation time using proven software and hardware. It also permits the ARPANET and later AUTODIN II

Phase I to be used as testbeds by the DoD over the next few years to obtain further experience in computer-communications networks. Feedback from military users would serve to adapt the system to user needs and point to an optimal lon term structure suitable for meeting the DoD computer-communications network requirements of the mid 1980's 4

5 Second, there is the need for a system architecture and switch configuration that is matched to the needs of computer-communications. The concept of a few central switches (e.g. at the AUTODIN I switch sites) is incompatible in many ways with the notion of a computer-communications network. The current AUTODIN II Phase I concept requires new, unproven hardware and software for large switches with a high connectivity to 50 or more hosts. This compares to the distributed switch concept of the ARPANET which locates small switches (IMP's and TIP's) generally at host computer sites. These switches are small proven devices which can be easily proliferated to a large number of sites. The current eight switch concept of AUTODIN II Phase I requires each host to connec to the switch via a more difficult "VDH" type interface and places critical demands on the design of the central switches. The desirability of having a backbone subnet for survivability can be seen but not the need to restrict the AUTODIN II Phase I switch sites to only these backbone locations employing very large complicated switches. An alternate approach (described also in a Networ Analysis Corporation study of June 1975) indicates that a distributed architecture is more reliable and less costly in communications. In addition, the savings in simplier host interfacing is potentially even larger since each host will have its own IMP-like device. Finally the connection is more reliable since each host will have two or more paths to other sites. The importance of the distributed switch concept should be recognized early in the RFP planning stage for AUTODIN II. 5

6 Third, end-to-end encryption should be required for use in AUTODIN II Phase I All the available evidence indicates that this approach will be far less costly and more effective than the use of link encryption alone. The use of link encryption alone requires that each switch site be a secured facility staffed b personnel cleared to the highest levels as is the case with AUTODIN I switches. This is necessary because in a link encrypted only mode, all data is in the

clear in the switch. The expense of providing such high levels of security in each switch will limit the number of AUTODIN II switches to a relatively small number. End-to end encryption allows packet to transit between secured hosts without decryption in a switch. This mode permits the consideration of AUTODIN II switch sites which require physical security and operating personnel with lesser levels of clearance. In the case of AUTODIN II links where traffic analysis protection is required (packet headers are not encrypted between switches) link encryption could be provided. 6

7 Security considerations have been one of the primary driving forces focusing the design of AUTODIN II toward large, highly connected, fully secured switches connected to other switches and host computers by linked encrypted lines. Packet encryption technology is at the point that within a few years, we believe, end-to-end encryption devices will completely change the way that AUTODIN II would be structured.. Point -to point packet encryption devices (PLI's) developed by ARPA and NSA are expected to be available this fall, multi-destination PLI's in six to nine more months, and remotely keyed end-to-end encryption devices within several years. The costs of operating those links which need to be secured in the end-to-end encrypted mode (note onl a small percentage of traffic requires encryption) will provide significant savings over the costs of operating the entire network with highly secured, highly connected switches in a link encrypted mode. 7

8 Based on the premise that AUTODIN II Phase I will provide near-term support t DoD computer-communications requirements and will serve as a testbed for a fina system, the following program is recommended: 8

8a a. DCA utilize the ARPANET to gain experience in computer-communication network operation, user requirements, and design considerations. 8a

8b b. Rather than pursue a major design and devlopment effort for AUTODIN I Phase I, adopt the proven hardware and software technology of the ARPANET to establish a separate military computer-communications network. 8b

8c c. Provide network security initially by PLI's and evolve later to remotely keyed end-to-end encryption systems. 8c

8d d. Continue to support efforts in network software development tuned to military requirements, investigation of improved survivability options, long term switch design requirements, links with WWMCCS, intelligence systems and other Command and Control systems leading to a well considered design for a 1985 DoD computer-communications network. 8d

9 Specific additional comments on the draft memorandum are provided in the following paragraphs: 9

9a a. Enclosure 1, Page 5. Reference the comment concerning the requirement for standard host-to-host protocols. Experience with the ARPANET indicates that protocols for a computer-communications network are a dynamically changing set of rules which reflect changing requirements and the need for new capabilities. It is suggested that DTACCS consider the establishment of a mechanism for changing these protocols over time which considers both the need for new capabilities as well as the cost impact to network users for th implementation of proposed changes. 9a

9b b. Enclosure 1, Page 3. Reference the comment that research in ADP security should be emphasized. ARPA has pursued for a number of years a 6.2 research program in system and network security. This program is continuing with particular focus on addressing the security issues faced by a computer-communications network, such as, AUTODIN II. Several Command and Control experiments are planned over the next few years which will involve the use of secured computer systems on the ARPANET linked to users by host-to-host packet encryption devices. Results obtained from these experiments are expected to be useful input to the AUTODIN II Phase I system security design. 9b

10 The technical resources of ARPA are available to assist DTACCS in evaluating AUTODIN II issues. 10

(J32800) 22-JUN-75 19:14;;;; Title: Author(s): David C. Russell/DCR2; Distribution: /STW([ACTION]) ; Sub-Collections: NIC; Clerk: DCR2; Origin: < RUSSELL, DTACCS/REPLY.NLS;6, >, 22-JUN-75 19:12 DCR2 ;;;;####;

DLS 23-JUN-75 06:27 32801

Standard Formats for IS Memos...a Proposal?

If this looks reasonable, can we have a meet on the subject, say 16:00 on the 23rd?

DLS 23-JUN-75 06:27 32801

Standard Formats for IS Memos...a Proposal?

1 I have a similar set of directives for printing memos (like those going to procurement) on letterhead paper. I also have one for SOW's, which make it come out like the PR unit likes to see it. Suggest that we collect these in a common place and add a few more dirs to take care of margins, indentation etc. for the TYCOM and gradually turn these into the standard way of doing business. We might also include in the first statement, some directions for aligning the typewriter...start position relative to paper being used and left margin setting. 1

2 At one time I set up a branch named (forms) in everyones directory, with links to journaled items containing formating info. This may be a bit complicated for the novice, as it requires a double Jump Link and a copy. It also requires someone to maintain the list as changes or new forms are added. 2

3 We could create a file in Marcel's, Carrier's or Tomaini's directory containing formats. This might be better than Journaling, since there will inevitably be changes required...at least until we get all the apparent bugs ironed out of each one. For example in yours (HJOURNAL, 32789, 1:w) there should be a a a (instead of .GYS=3;) prior to the signature block, probably a 3

DLS 23-JUN-75 06:27 32801

Standard Formats for IS Memos...a Proposal?

(J32801) 23-JUN-75 06:27;;;; Title: Author(s): Duane L. Stone/DLS;
Distribution: /RJC([ACTION]) EJK([ACTION]) ELF([INFO-ONLY])
JLM([INFO-ONLY]) ; Sub-Collections: RADC; Clerk: DLS;

LAC 23-JUN-75 06:36 32802

ARPA-NSW users under ARPAA

1 Reference your (journal,32762,) : The directories, besides SIALOG which should be under ARPA-NSW include AFDAA-XO, and all the DSDC-xxx directories (ie, -PR,-SC, -SG, -SYD, -SYO, -XF) You might also check to see if the directory AFDSDC is under ARPA-NSW, as it should be. Thanx/Larry 1

ARPA-NSW users under ARPAA

(J32802) 23-JUN-75 06:36;;;; Title: Author(s): Lawrence A. Crain/LAC; Distribution: /RA3Y([ACTION]) CKM([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: LAC;

DLS 23-JUN-75 06:56 32803

Suggestions for OP Guide and Directives

1 While WUCing away the other day, I stumbled across the text of the Output Processors Guide. I'd like to suggest that a page be included that graphically illustrates the relative positions of the various margins. Users have to build up a mental image of this now for themselves. In our case we made one up and inserted it in the copies of the guide we have. 1

2 For those that might be accumulating a list of directives that would be nice to have some day, I have a couple. 2

2a One I mentioned in a sndmsg...a directive to control the form in which the date is displayed by the GD directive. 2a

2b Another which would allow the specification of the IFIRST directive on a level basis, similar to the PXILEVJ directive. This would be useful for memos here, where the "official" format calls for a 5, 10, 15,...space indentation of the first line only, depending on its level. 2b

DLS 23-JUN-75 06:56 32803

Suggestions for OP Guide and Directives

(J32803) 23-JUN-75 06:56;;;; Title: Author(s): Duane L. Stone/DLS;
Distribution: /NDM([ACTION]) DVN([ACTION]) FEED([ACTION])
KIRK([INFO-ONLY]) EJK([INFO-ONLY]) RJC([INFO-ONLY]) ;
Sub-Collections: RADC; Clerk: DLS;

JMZ 23-JUN-75 07:07 32804

try this

1 this is a test 1

(J32804) 23-JUN-75 07:07;;;; Title: Author(s): June M. Ziebell/JMZ;
Distribution: /FPA([ACTION]) ; Sub-Collections: NIC; Clerk: JMZ;
Origin: < DSDC-XF, JMZ.NLS;2, >, 1-MAY-75 04:56 JMZ ;;;;####;

RA3Y 23-JUN-75 07:47 32805

Linking

1 Hi, Gwen. I see that you are using the system a bit lately. About three times in the last week, I've noticed you on the sys when I logged in, but you were always in private mode (sensible, in light of the amount of linking that gets done here). How are your thesis and the evaluation study coming along? I've been hopping down here, trying to grind out a budget for our next twelve months. Roger has his Communication/Substitution Tradeoff study going now. I met Roger Pye last Friday, and Rich Harkness will be coming in next week. 1

Linking

(J32805) 23-JUN-75 07:47;;;; Title: Author(s): Raymond R. Panko/RA3Y; Distribution: /GCE([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RA3Y;

RWW 23-JUN-75 11:31 32806

Some Recent Dialog among the Message Service Committee

BBN has recently released a new Mail system MAILSYS and it is planned that it will be used by various 'DoD' Opinion leders and a group is using it comparing it with other mail sytems etc and generally shaking it down before its releas. HerY is the dialog of the past couple of weeks. I have sent them the user interface chapter from the recent final report we are working on as there is lots of dialog about command language design.

RWW 23-JUN-75 11:31 32806

Some Recent Dialog among the Message Service Committee

1 22-JUN-75 1631-PDT STEFFERUD at USC-ISI: MAILER, MAILSTAT, ETC.
Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 22-JUN-75
16:40:47-PDT 1

1a Dave Crocker's question about MAILER sending mail out of order prompts me to ask why MAILER and MAILSTAT and SNDMSG (and XMAIL?) are not in agreement on how to handle HOST name recognition. 1a

1b It seems to me that SNDMSG recognizes HOSTs with a minimum type-in
and without confusion between upper and lower cases. 1b

1c Mailstat will accept HOST names in either case, but will not recognize
anything less than the full typeout of the HOST name. 1c

1d Then, after renaming a HOST or a DIRECTORY name for MAILER, after
MAILER refuses to mail an improperly addressed msg for instance,
MAILER refuses to recognize lowercase directory or HOST names. 1d

1e I may have some of the details wrong but the inconsistencies are
a fact, would some one please track down the true facts, and
then take action to make them consistent. The SNDMSG reconition
and handling rules seem to be prefered over the others, though
some rethinking of the whole thing might be appropriate in the
context of Jom Ellis' suggestion about Command Standards and Dave
Crocker's distertation on Command Strucures and their reconition
and invocation. 1e

2 22-JUN-75 1445-PDT WALKER at USC-ISI: LOWER CASE AT ISI
Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 22-JUN-75
14:46:11-PDT 2

2a Thanks for your comments, Dave. Last Friday I asked several people why
ISIA had upper case as a default. No one has commented on why it is;
I suspect that it just happened. If no one objects in the next day
or so, I will request that the default be changed to upper/lower. 2a

2b Steve 2b

3 21-JUN-75 1516-PDT DCROCKER at USC-ISI: Nits: ISI and Mailer
Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 21-JUN-75
15:29:05-PDT 3

3a 1. Why does ISI default to RAIsing lower case to upper case?

2. Why does MAILER continue to deliver mail out of sequence, by working from the highest version number to the lowest, instead of vice-versa? 3a

4 21-JUN-75 1335-PDT DCROCKER at USC-ISI: Thoughts on Command Specification Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST; Received at: 21-JUN-75 13:48:37-PDT 4

4a While keyword -- as opposed to obscure character (e.g., "%") -- invocation of functions appeals to me, I have become very wary of being locked into having the first-character typed cause automatic command completion and invocation, as is embodied in MSG and XED. Too many contortions are needed to think of the command word. The problem becomes especially severe when the system has many commands. This, and the advantage of "chunking" conceptually similar commands together, is why I am lobbying for multi-part commands. Ron Tugender and I discussed the problem of command specification and settled on a variation of the SRI-ARC NLS scheme that would be essentially as follows: 4a

4b Our intent was to reduce the number of key strokes necessary for a) proficient users and/or b) frequent commands, while providing a more simple, predictable interface to the naive user. 4b

4c The system may be tailored for frequent-command preference, automatic completion, and automatic invocation. In the former, frequently-used commands are disambiguated by their first character. All other commands must be preceded by a blank. (For completeness, the preferred command may also be specified this way) The latter features automatically complete and/or invoke a command as soon as it is disambiguated. 4c

4d At any time, Question mark will provide a list of commands acceptable at that point (cf. Tenex Telnet, Mailsys). It and escape will also automatically print as much of the rest of the command word as is common to all the alternatives. (If I have typed a "D" and then question mark, the system would type an "e" for me and then show "Delete" and "Describe." I would then not have to type the "e.") In passive mode, escape and blank will perform the same actions as currently are performed by the Tenex Exec. 4d

4e With these three options, several tailored environments may be established, according to user proficiency and preference. A sophisticated user, on a speedy terminal, will have all three functions turned on. The Command interface will then look very similar to MSG, except that there will be some commands that require several strokes, with <space> as the first, to specify. The advantage this offers over the current scheme in (e.g.) MSG

is that ALL commands may then have intuitive labels. (As per my earlier comments about Mailsys.) 4e

4f A naive user will have all the features turned off. In addition, he is not told of the recognition/completion capabilities available with <space> and <escape>. He therefore must type the full command word(s) and invoke them with carriage return. Very slow but very natural. When he starts complaining (or investigating the full documentation) he discovers <blank> and <escape>. Eventually, he may also want the single-character invocation mode. 4f

4g Other operating modes are apparent and useful, as in the case of slow terminals (auto-completion turned off). For these sorts of options to be reasonable to use, there must also be a permanent profile facility, to record the desired defaults. Xed has such a facility. Others are planned. It would be useful to have a generalized profile facility so that the user's directory does not become cluttered with many different profile files. Additionally, these files tend to waste a great deal of space. Xed uses one word, out of an entire page. 4g

5 21-JUN-75 1258-PDT DCROCKER at USC-ISI: Reactions to Mailsys
Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST; Received at: 21-JUN-75 13:07:18-PDT 5

5a At the beginning of spring, last year, Nancy Neigus (BBN-IMP group) and I reviewed the design specifications for what has become Mailsys. At the time, we were chairing the USING group. At the end of last month, I shared some of my reactions to the existent system with the Jerry Burchfiel. You might be interested in the gist of my comments: 5a

5b I especially like the header-printing and filter controls and the ability to selectively and iteratively create and modify portions of the message, before sending it -- as opposed to the non-reversible sequence in Sndmsg. 5b

5c Unfortunately, I am less enthusiastic about some aspects of the user interface. I am making a distinction between the functions performed (which I like a lot) and the way the functions are invoked. The "Tenex Exec-like" capabilities of command completion and optional invocation of sub-commands (via comma) are great. 5c

5d However, there are at least four different commands that cause printing at the terminal (Read, Display, Printfilter, and Survey) and several other commands constitute variants of conceptually similar actions. Also, use of "%" and "*" (rather

than "first,", "last," "current," and "all") is extremely non-intuitive. The end effect of these two characteristics is that Mailsys feels extremely complex and is not trivial to start using. 5d

5e I want to strongly looby for multi-part commands, so that functions which appear similar to the user (I don't care how different their actual code is) can be invoked similarly. 5e

5f Consequently -- for example -- the printing commands would be much more pleasant to use if invoked with "Show Message ...", "Show Filter...", "Show Menu", etc. (I don't feel religious about using the keyword "show.") Any reasonably intuitive word is fine. However, my feeling is that "read" is not intuitive as a COMMAND. It is an accurate description of what I want to do, but not of what I want MAILSYS to do. I may be wrong about this particular psychological point, but I wanted to illustrate the kind of considerations which are critical to making Mailsys seem friendly. 5f

5g And therein lies an interesting point. Mailsys has lots of very friendly features, but their effect is seriously limited if the user perceives the system, as a whole, as being too complex. Having "?" generate in excess of 50 lines of commands is damn scary, especially since the commands are not listed alphabetically. (Side comment: I really like the partial-command "?" capability, as well as the single-character aliases for some commands, though I suggest that the aliases not be included in a "?" list.) 5g

6 20-JUN-75 1529-PDT DCROCKER at USC-ISI: Getting Specific: Recommendation and Attempt Distribution:
[ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 20-JUN-75 15:43:10-PDT 6

6a Judging from the comments of the last week, it may be useful for us now to begin a directed effort to develop specifications for an idealized (if not ideal) message processing system. Jean Iseli's approach has the advantage of being concise, so we may want to work from it, expanding and modifying it as appropriate. We could take votes in order to determine to relative importance of various features. 6a

6b Mostly for the sake of variety, I offer an initial list of my own. I believe it reflects many of the wishes expressed during the current dialogue. We will not doubt find that many of the features are expensive to build and others are cheap, but we will at least be able to give very specific preference lists to Myer/Vittal/et cie. The following list describes features. I would like us also to delve into the realm of "feel." Exactly

how should the features appear to users? I will be sending some other notes concerning this. For reference, some of you may be interested in reading a draft of a paper that I wrote as a result of participating in Jim Carlisle's seminar on Teleconferencing. Many of the issues are the same. The formated file is in {ISI}<DCrocker>Teleconferencing-E199-Paper.Txt and is accessible through FTP. 6b

6c User Interface "Profiles" for user-specific tailoring, between sessions Intuitive command words Multi-level commands, for collecting generic functions Command macros Single interface to all the tools Variety of command invocation styles Ability to "hide" capabilities, to provide simple view 6c

6d Message Creation Create message fields in any order Creation separated from transmission Editor available for each/every buffer Spelling corrector Text formater Table of contents builder (?) 6d

6e Message Reading Ability to refer to classes of messages, by name (Recent, Old, ...) Labelled filters, by date and/or string content Table of contents generated Multiple open message files 6e

6f Message Filing Automatic filing, according to filtering System knowledge of file names (=> naming conventions) Ability to delete messages Ability to archive messages, only saving local pointer Automatic catalog building 6f

6g Misc. Answer-back facility (by secretaries, as well as recipient) Forwarding facility 6g

6h The above is by no means complete and I welcome comments from the
group. Dave. 6h

7 20-JUN-75 1444-PDT STOTZ at USC-ISIB: ISI's IA project
Distribution: MESSAGEGROUP: Received at: 20-JUN-75 14:44:59-PDT 7

7a I would like to introduce to all who are not already familiar
with it, the IA project at ISI. We are implementing a military
message service for a test in an operational military environment.
This project is independent of the MSG and XED editor developments at
ISI although there is some overlap of personalities. We are currently
coding the message creation and coordination phase of the service.

There is some background documentation I will send via U.S. Mail to anyone who asks me (please let me know your mail address with request).

7a

7b In many ways a military message service has the same requirements as one that serves computer researchers. The most distinguishing characteristic is that the message service that the military has now is extremely formal. Formal messages always pass between organization commanders (i.e. the message FROM field and the addressee fields contain the names of organization commanders even though the messages often are originated by and are eventually delivered to lower echelon people). Messages are archived for up to 7 years, and are considered to be statements of official position of the commander of the organization from which they originate. This introduces a need for "coordination" on outgoing messages and for "distribution determination" on incoming messages. Here coordination means getting consensus and approval of a message by a number of people in the organization. Distribution determination establishes who should get a copy of the message. Some fairly sophisticated algorithms have been developed for this this latter problem. It turns out that author designated keywords is one of the poorer ways of doing it.

7b

7c The military's requirements for security, privacy, accessibility and reliability are in general more critical than ours and military message systems deal in larger volumes of traffic. This last is aggrevated by the distribution algorithms which tend to send a copy to anyone who might be interested rather than risk missing the proper

message recipient. At CINCPAC an average of 40 copies are made of each message received. 7c

7d Another major concern of the IA project is how to provide an interactive computer service of this sort to users who have no background or training in computer based systems and who want to use the service to get a job done. 7d

7e The background documents describe our basic approach to all this and I will not belabor your TI terminals with it here. But let me briefly address a few issues that have been raised and how we plan to handle them. 7e

7f 1. Terminals - The IA service is being built at this time for CRTs only. This way we can provide a full screen editor which we feel is more natural to use. 7f

7g 2. Coordination - The IA message service will provide "coordination" which allows collection of multi-users edits, comments and sign-offs on a message prior to its release. 7g

7h 2 7h

7i 3. Message storage - To minimize storage requirements, IA keeps a single central copy of a message and distributes citations to it, rather than creating a message copy for each addressee. To simplify verification of system integrity, we plan to restrict user access to formal, archived messages to read-only. Thus any personal comments, etc., to be added by recipients will have to be stored in each users personal directory along with a hook to the appropriate message. 7i

7j 4. Distribution determination - Messages received by our

system will
have already been processed for distribution determination.
The IA
service will extend this by allowing the user to create his
own
routing tables for automatic redistribution of his traffic. 7j

8 19-JUN-75 1542-PDT STEFFERUD at USC-ISI: Re: appologies
Distribution: MYER AT BBN, [isi]<farber>messagegroup.list: Received
at: 19-JUN-75 15:58:46-PDT 8

8a Hi Al, Today my TI'#% is running at about 6 chars per second
for reasons that are not obvious, either net congestion or ISI
overload. 8a

8b I for one would just as soon not see the entire addressee list
on every message all day. Dealing with the effluvia from this
terminal is already bad enough without any surplus. 8b

8c May I suggest a convention that some of my friends and I use
for
short messages (notes we call them) which can be fitted into one
line of SUBJECT text. We bracket the Subject in $.....$ to alert
the receiver to not bother printing it out since it is all
contained
in the SUBJECT part of the SURVEY. Needless to say these notes
must be very short to avoid long printouts on the right hand half
of the page. 8c

8d Also, I am pleased to accept your appology. I appreciate the
difficulty of remembering that some of us are in oxcarts when
you are zooming around in your masserati. 8d

8e Best regards, Stef 8e

9 19-JUN-75 1527-PDT STEFFERUD at USC-ISI: RE: Command Nmemonics
Distribution: ELLIS AT ISI, [isi]<farber>messagegroup.list: Received
at: 19-JUN-75 15:58:56-PDT 9

9a Tom, I agree completely on the need for choosing prefered or
standard nmemonics for message filing systems, but I would like
to see the nmemonics structuring alternatives expanded beyond
a choice between MSG and XMAIL. For example, the NLS approach
to menu hierachies should be included in the exploration. I don't
know that NLS has the better answer, but their approach has
received
a great deal of thought and we should hear from them what the
advantages are and why they like it. 9a

Some Recent Dialog among the Message Service Committee

9b I think this issue is at the core of the problem. XMAIL assumes
that the TENEX command structure is the best basis, while MSG assumes that there is some other more humanly intuitive structure. MSG has some of the properties of the NLS structure, but has not carried it through out the language. 9b

9c Best Regards, Stef 9c

10 19-JUN-75 1514-PDT ELLIS at USC-ISI: COMMAND MNEMONICS Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 19-JUN-75 15:18:05-PDT 10

10a I think it is time for this group to try to publish a set of "preferred" command mnemonics for message processing. Hopefully, it is not too late! However, if we don't, we can only blame ourselves for further proliferation. 10a

10b I suggest a way to get started is for Myer and Vittal to provide
a short treatise on pro and con of their approaches (i.e., Vittal's
obvious problems with his single letter commands .. albeit they're very efficient). 10b

10c Also, comments from Gilbert, Uhlig and Tasker on any serious conflicts we're generating with deeply ingrained DoD traditions. 10c

10d Regards, Tom 10d

10e TOE/ph 10e

11 19-JUN-75 1151-PDT WALKER at USC-ISI: Al, Thanks, Welcome and a Complaint Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 19-JUN-75 12:09:54-PDT 11

11a All that amazing stuff and no subject for my simpleminded system
(namely: me) to file by. Really great! 11a

11b Its not your long windedness that bothers me, its the two feet of my valuable paper that you wasted after you were finished but your
system wasn't. 11b

11c Anyway, thanks for your valuable comments. I think many good ideas are
beginning to appear more and more often here. Perhaps there is hope in this process converging on a set of reasonable concepts. 11c

11d I for one would like to try the ISI version of your system. Sounds very interesting (and anything that can eat up all those keywords must be wonderful). 11d

11e I am gratified to note that most members of the Message Committee have joined our dialogue, and no one has begged to get out yet. Thanks for all your contributions. 11e

11f Steve 11f

12 18-JUN-75 2242-EDT MYER at BBN-TENEXA: COMMENTS ON MESSAGE SYSTEMS Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST;, pew, nickerson, Message-ID: <[BBN-TENEXA]18-JUN-75 22:42:33-EDT.MYER> Received at: 18-JUN-75 20:08:35-PDT 12

12a Here are some initial thoughts on NMSG and Mailsys. First off, I'd like to comment separately on what we see as the two basic functions of these programs -- reading and processing existing messages on the one hand and creating new messages on the other. 12a

12b The message processing part of NMSG has an extremely clean, smooth human interface. It lets most of the essential things happen with a minimum of effort and permits the user a simple mental model of what's going on. 12b

12c In contrast, the MAILSYS reading and processing commands have tended to confuse people, and make some rather basic operations quite hard to accomplish. For some time we've been in the midst of overhauling this part of Mailsys, with the aim of making it much more attractive to its user. Jim Calvin's HG program was an early experiment in this direction. In the overhaul process, we have found it profitable to draw on the good work that went into MSG and its predecessors, and the same is certainly true of NMSG. 12c

12d Some things we particularly liked in NMSG and will bring out in a new Mailsys are: 12d

12e . the simple command language 12e

12f . the way of specifying message sequences and the very easy way you can get special sequences (by A,D,F, etc.) 12f

12g . the explicit message pointer (current message number) and the manipulations you can perform on it. 12g

12h . the uniformity of command groups such as PUT, TYPE, LIST and MOVE.

We also liked convenience features such as the automatic surveying of recent messages, the inclusion of headers on message listings, printing "+" and "-" on surveys, and the ability to specify an object file on entering NMSG. 12h

12i We have a somewhat different view on the matter of message
creation. In company with several other systems NMSG relies on the earlier SNDMSG program as its workhorse for outgoing messages. As you all know, SNDMSG employs a prompt-driven form of input that leads the user through the steps of message creation. Our view is that this approach has several limitations:

. You have to create message parts in the fixed order that's built into SNDMSG. 12i

12j . There's no way to go back and change a part once you have created it. 12j

12k . It's hard to see how you could gracefully extend SNDMSG to let the user select a subset of the many header fields now allowed in RFC-680.

Because of these problems we took a "user-driven" rather than prompt-driven approach in structuring the create part of Mailsys. Hence the separation between creating a message and sending it, the ability to create message parts in any order and at the "top level" of Mailsys, and the ability to manipulate message parts, once created, through DISPLAY, ERASE, EDIT, FORMAT, ADD, and SAVE. 12k

12l An interesting by-product of this approach is that it's quite
easy to make special prompt-driven sequences by "wiring up" groups of create primitives. The MAILSYS commands FORWARD, REPLY, and SNDMSG were all done this way, and we will soon make it possible for users to specify their own sequences. 12l

12m We are frankly pleased with how this part of Mailsys has turned
out. However, that doesn't prove that the world will be, so we'd very much appreciate any feedback you can provide. In particular, we'd like to know how the rest of you feel about user driven vs

prompted input, and how you feel about our particular implementation, specially with regard to human factors. 12m

12n The foregoing sums up our initial reactions. However, we're continuing to review both systems, and I expect to have some further thoughts and questions in the next few days. 12n

12o /Ted Myer 12o

13 18-JUN-75 1228-PDT VITTAL at USC-ISIB: NMSGG Release as MSG Distribution: MESSAGE GROUP: Received at: 18-JUN-75 14:04:12-PDT 13

13a I would like to release NMSG in its current form to the world at large sometime next week. It is intended to replace the current MSG. If there is anything you feel strongly about seeing in the released version, or there are any objections to its being released, please let me know. This is not meant to indicate that the development of MSG will terminate. There should probably always be an experimental version open to the group which represents the current state of development of MSG. 13a

13b I await your comments.
John 13b

14 13-JUN-75 1900-PDT FARBER at USC-ISI: stefferud 13 june 1975 1515 pdt Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 13-JUN-75 19:02:15-PDT 14

14a Message-ID: <[USC-ISI]13-JUN-75 19:00:05-PDT.FARBER> 14a

14b I agree with the need expressed by Stef. I feel that I am turning into a file clerk. As do many of us we keep separate files that we put different items into. I note the KEYWORD feature of the MAILSYS (XMAIL) system and feel that the two things are interrelated. One problem is that there is no way I can "add" a field to a message I have received and then do something with it. If I could add the KEYWORD field or for that matter a subject extention field etc then I believe that much of what stef wants could be gotten without much apparatus. In addition I think the general capability would be useful. 14b

14c Dave 14c

15 13-JUN-75 1516-PDT STEFFERUD at USC-ISI: Message FILING Function Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST:, stefferud Received at: 13-JUN-75 15:17:00-PDT 15

Some Recent Dialog among the Message Service Committee

15a Greetings, 15a

15b NMSG certainly is a step forward. It is my choice for processing my own files of messages. 15b

15c In fact, I find that NMSG is really my on-line file processing system for my "Network" office. I really have two offices. One in here and the other out there with conventional fixtures and file folders etc. 15c

15d What I have out there, but don't have in here, is some way to make notes on the corners of my messages. 15d

15e Out there, I keep track of who got copies: bcc from me, forwarded through me, etc. 15e

15f I would like to see the discussion group consider that NMSG, XMAIL, HG, ETC, are really on-line message filing systems that should allow us to do the kinds of things we do with paper files, in addition to the kinds of things we do with computer files. I don't see any reason to give up the benefits of one to get the other. 15f

15g I realize that this raises some difficult problems, but not insurmontable ones. The most difficult part would appear to be the means for modifying a message after it is received, in order to attach notes to the corners. 15g

15h What I suggest is a FILING field that I can add, the same way that I can add a BCC field to an outgoing message in XMAIL. (I sure wish NMSG had BCC.) Then we need "String Search" on the new FILING field so we can go looking for things by our remembrence of our annotations, instead of what some sender thought I would like to have in the SUBJECT field. It should be obvious that there is no way for the senders of messages to get the desired tning in the SUBJECT field more than half the time. 15h

15i In terms of ISELI's Functional list, I suggest that we add the FILING function. By the way, I endorse Iseli's list and look forward to seeing how our competing systems show up when the evaluators show us their results. 15i

15j Best regards to you all, Stef

15j

16 13-JUN-75 1507-PDT FARBER at USC-ISI: an answer and an item for the group Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 13-JUN-75 15:13:28-PDT
16

16a 1 13 JUN DCROCKER Re: a query re terminal speeds 2 13 JUN CALVIN at BBN-TENEXA Hg
16a

16b 1 -- **********
Date: 13 JUN 1975 1140-PDT
From: DCROCKER
Subject: Re: a query re terminal speeds
To: FARBER
16b

16c In response to your message sent 13 JUN 1975 0925-PDT
16c

16d Oh boy, do I agree with your concern!
16d

16e 2 -- **********
Mail from BBN-TENEXA rcvd at 13-JUN-75 1249-PDT
Date: 13 JUN 1975 1545-EDT
From: CALVIN at BBN-TENEXA
Subject: Hg
To: farber at ISI
16e

16f Point of information (i just got a note via somewhere about this): I
wrote HG here at BBN. If you've any questions or comments about it,
please feel free to send them to me.
jim calvin

16f

17 13-JUN-75 1424-PDT TASKER at USC-ISI: NMSG Abort Character/Sequence Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST:, ngoodwin at bbnc, wilcox, pacomj6 Received at: 13-JUN-75 14:33:58-PDT
17

17a John:
17a

17b The message I just sent to you Re NMSG was aborted in the middle of transmission to the addressees. I was called away from the terminal while SNDMSG was doing its laborious thing with the distribution list and some line hits caused the abort message and also produced a "y". Presto! The rest of the addresses had to be included in a retransmittal.
17b

17c Extensive experience with line hits and TECO suggests to

me that DEL is probably one of the poorest choices for an abort character. Furthermore, I think the abortion process at certain stages of activities (like the TO and CC and Send) should require more than just two letters. It is very unlikely that I would abort in these stages, so, as a result, I would be very happy to put up with having to type in "YES" and then confirm with a <CR>. 17c

17d Aloha,
Pete
-- 17d

18 13-JUN-75 1349-PDT TASKER at USC-ISI: NMSG Observations
Distribution: WATSON AT OFFICE-1, VEZZA AT MIT-DMS, MEALY AT HARV-10, [ISI]<FARBER>MESSAGEGROUP.LIST; Received at: 13-JUN-75 14:07:11-PDT 18

18a Dear Group: 18a

18b I am finding NMSG quite interesting and not too hard to adjust to from BananaRD (which was my previous favorite). I particularly enjoy the convenience the F and A commands provide: previously I had to use temporary files for such activity (especially F) and I never felt that a non computer freak would take to that. 18b

18c I do find the Answer command could use another sub-option, namely, one that allows the answerer to ADD a person to the address list. Sometimes, after a dialogue with one or two we find it desirable (or necessary) to include another party. (Sometimes older messages must be forwarded to him, but as often, there is enough context in the answer to make that unnecessary.) In mentioning this to Nancy (NGoodwin@BBNC) she indicated the following: 18c

18d With MAILSYS REPLY is used the way ANSWER is in NMSG, I guess.
The author of the reply can add to the address list, and the subject line if he/she answers NO in response to an automatic system question SEND? after the body of the message is complete. The additions appear in the second and onward lines of the message header fields, so would not appear in a SURVEY (I'm not sure about NMSG surveys). If the author adds still more text, the SEND question is not asked again, but use proceeds as usual. 18d

18e What do the rest of you find regarding the need for such an additional
suboption? 18e

18f Regarding the filtering: Maybe I just don't keep enough mail on-line to fully exercise these options - but I find the subjects of the messages I receive often of VERY litle help in pointing to the contents. This becomes worse after an extended number of messages have been exchanged on a topic. The national level military community has come to the same conclusion and is now having systems built that construct lists of keywords from a complete text search. However, maybe provision of these masks will encourage people to pay more serious attention to the construction of the subject. (This is not always the answer since we often want to summarize our main interest or thought in the subject for emphasis or attention-catching, thereby leaving out any subordinate thoughts that might have been included in the text. Furthermore, the author's keywords may well not be those used by the recipient.) For the present, I tend to use separate files to keep my stuff in order.
Anyway, the military (I include the intelligence functions in that term) has struggled with the problem and there is, as yet, no non-trivial solution. 18f

18g I have had some problem with "Are you sure you want to abort?" message under the TO and CC portions of any of the commands involving SNDMSG with an environment of two to three line hits per minute. So far, whenever a line hit(s) has caused the abort message, I have immediately responded with "N" and received the abort message at least another time -- if not several more times. Is this just a function of my noisey lines? 18g

18h Re Dave's comment about speed of terminal: I agree!! (although you might not have guessed it from the length of this missive). The terminal speed will also have a very significant effect on the communications (Net) and the host loading. The way I used the 2400 bps terminal in Rob's office was VERY different from the way I use my 300 bps TI735. 18h

18i Anyway, guys, keep up the good work. You have come a ways from READMAIL. 18i

18j ALOHA,
Pete Tasker
(At CINCPAC Headquarters, Hawaii) 18j

18k ------- 18k

19 13-JUN-75 0933-PDT VITTAL at USC-ISIB: Re: Walker's NMSG comments Distribution: MESSAGE GROUP: Received at: 13-JUN-75 09:38:17-PDT 19

Some Recent Dialog among the Message Service Committee

19a First, the prompting issue. There are three different type-out (prompting) modes in NMSG. There is the normal that you get when you start it up, a verbose mode which the V command will provide, and a concise mode which the K command will provide. The V command will cause additional prompting like Forward (message sequence) as Steve suggests. The only reason you want the verbose mode is when you are starting to learn msg. After a relatively short startup time, the additional typeout becomes overbearing, but if you want it you can always type V and get it. The concise mode shortens typeout even more than the normal mode, and is sometimes very criptic -- it should NOT be used by novices. 19a

19b About the Answer vs. Forward. It is well understood what it means to forward several messages at once (this is allowed), but it is not understood what it means to answer several messages simultaneously. Does everybody on all lists get a copy of the response? I think that the only reasonable solution is to be able to answer exactly one message. The problem then becomes (in the MSG domain) of how do you specify the message number being answered and the sub-command (if one is given) both in a clean way that is consistent with the rest of the MSG command structure. A suggestion goes something like the following:

Answer <sub-command> in message number: xx

This is probably the closest alternative solution to the one that's implemented that is in the right 'spirit'. However, the reservation that I have is that it is probably better to know what you're answering BEFORE you specify the <sub-command>. These are about the only reasons that it's structure is as it currently exists. Any suggestions? Forward will not be changed. 19b

19c John 19c

20 13-JUN-75 0925-PDT FARBER at USC-ISI: a query re terminal speeds
Distribution: [ISI]<FARBER>MESSAGEGROUP.LIST: Received at: 13-JUN-75 09:31:40-PDT 20

20a Message-ID: <[USC-ISI]13-JUN-75 09:25:52-PDT.FARBER> 20a

20b I would like to point out to those who are blessed with access that allows 2400 speed terminals that there are those of us who get our mail at 300 speed. I wonder what the effect is on the

appearance of the mailsystems. I believe that many of the ways we are doing things would change. (like the appearance of network notes -- short and sweet). Should we be thinking of this as an important issue or will our users, as opposed to implementers, have high speed access? 20b

20c Dave 20c

21 857 : Mail from MIT-DMS Distribution: WATSON Received at: 19-JUN-75 15:38:47-PDT 21

21a DATE: 19 JUN 75 1726-EDT
FROM: AV at MIT-DMS
SUBJECT: My Apologies.
KEYWORDS: carriage-returns, field, subject, Apologies
ACTION-TO: Mealy at HARV-10, Watson at OFFICE-1, Uhlig at OFFICE-1, ACTION-TO: Stotz at USC-ISIB, Vittal at USC-ISIB, PBaran at USC-ISI, ACTION-TO: DCrocker at USC-ISI, Isell at USC-ISI, Kirstein at USC-ISI, ACTION-TO: Ellis at USC-ISI, Stefferud at USC-ISI, Farber at USC-ISI, ACTION-TO: Walker at USC-ISI, Mclindon at USC-ISI, Tasker at USC-ISI, ACTION-TO: Gilbert at BBN-TENEX, Myer at BBN-TENEX, ACTION-TO: Burchfiel at BBN-TENEX
MESSAGE-ID: <[MIT-DMS]19 JUN 75 17:31:26-EDT.17754> 21a

21b My very humble apologies to all of you. All was my fault not the systems, the missing subject field and the 100 or so carriage-returns at the end of the message. 21b

21c A1 21c

22 8481 : Mail from MIT-DMS Distribution: WATSON Received at: 19-JUN-75 10:32:50-PDT 22

22a DATE: 19 JUN 75 1207-EDT
FROM: Vezza at MIT-DMS
KEYWORDS: no-conference, simplicity-of-use, message-service-complexity, KEYWORDS: message-composer, message-reader, third-party-record-service, KEYWORDS: answer-message-group, high-speed-terminals, message-systems
ACTION-TO: Mealy at HARV-10, Watson at OFFICE-1, Uhlig at OFFICE-1, ACTION-TO: Stotz at USC-ISIB, Vittal at USC-ISIB, PBaran at USC-ISI, ACTION-TO: DCrocker at USC-ISI, Isell at USC-ISI, Kirstein at USC-ISI, ACTION-TO: Ellis at USC-ISI, Stefferud at USC-ISI, Farber at USC-ISI, ACTION-TO: Walker at USC-ISI, Mclindon at USC-ISI, Tasker at USC-ISI, ACTION-TO: Gilbert at BBN-TENEX, Myer at BBN-TENEX, ACTION-TO: Burchfiel at BBN-TENEX
MESSAGE-ID: <[MIT-DMS]19 JUN 75 12:08:01-EDT.17739> 22a

22b Sorry to have been silent for so long. I think I finally

caught up with what has transpired thus far, so I'll add some of my
comments to this potpourri. 22b

22c There certainly are things you can do with a high-speed terminal that are at best painful with a 30 or 60 character/second one. It admits to a different modus operandi. One is not so worried about compressing things into one line. One scans and searches data bases differently. I don't mean brute force, but at each point in the search, more information about the situation can be presented to the user. For instance, because I typically use a 2000 character/second terminal, I don't mind printing out 20 or so message headers including the subject field when I am searching for
a message in my data base (which, by the way, currently contains over 600 messages). Also, one of my pet peeves is that no message system (including the DMS message system) expands the TO field so that one can see who was sent a copy of a message when the TO field
was specified by a list-name instead of by a list. Again, because of the high speed terminal I use, I don't mind having the list expanded and seeing all the names. However, I realize that those with low speed terminals would object, and rightly so. This is a problem because the list of names is modified by additions and deletions; therefore, it is not always possible to ascertain exactly
who has obtained a copy of a paticular message. I think you can see
what I am getting at. It is often important for coordination purposes to know who has been sent what. This is especially true at
the executive decision making level. Solution: Transmit the list name and the list. Modify message reading systems to inhibit printout of the list per se, but allow the user the option of requesting the list when he desires it. 22c

22d A person composing a message should be able to modify any field at any time except those fields that are stamped by the message system, i.e., sender for athentication purposes, date, time,
and message id fields. Likewise the recipient, for the purpose of adding notes, keywords, comments, etc. Why is it not this way? I suspect that there is some notion in the minds of message system implementers about message integrity, the idea being that a message
system which allows users to tamper with messages could not be used
for record traffic. Thus, I suspect many of the difficulties associated with adding notes, changing fields, etc., is really a

design decision. I don't know this for a fact, but I suspect it's true. One solution would be to provide a third party recording service for record traffic. Thus, when anyone wants to send a recorded message, he would send it indirect through the third party recording service which would stamp the message, send it out to each recipient, and keep a copy of it for record purposes. Although this seems cumbersome, I think it would be far easier to get such a mechanism certified than it would be to get message systems and operating systems certified. 22d

22e Someone, I believe Vittal, raised a good issue about using one message to answer several. (As I am doing with this one.) Clearly, we want to be able to do that. Perhaps it wants to be a different command, such as "answer group", where the arguments to that command are either a list of mesages or a group name for a set of messages that have been collected under that group name. Reply to and references want to have all the reply to and reference numbers in those fields. The subject field probably doesn't want to be stuck in automatically. The To and Carbon Copy fields probably do, but again, the sender must be given the option of editing them. 22e

22f I think Paul Baran had a good point about making a simple system. We indeed should have the capability somewhat like the one he described, but the system shouldn't stop there. That is to say, if a user of such a system wants more capability and is willing to learn how to use it he shouldn't be prevented from doing so. It has been my observation that once people get hooked into one of these systems, even "non-computer types", they demand more, not less capability, and nothing is more frustrating than to discover that one can't perform a seemingly simple task because the system doesn't provide the capability. The difficulty lies in getting over the initial hurdle so that the person can see for himself that use of the system provides a pay off. Having done something very similar once before -- that is, from the DMS, automatically log in to another computer on the ARPANET, activate A program and obtain results from that program, all without the user knowing the details of how it was done or for theat matter hiding it so that he didn't know that another computer system was being used. It can be done.

it would be interesting and useful to develop such an adjunct to the
message services, but for such a system to be made operational a great deal of cooperation is necessary. For instance, I have noticed that recently ISI had a global change of account numbers. If systems like ISI still wanted to maintain such flexibility and there were many terminals on the Net that logged in automatically, each terminal's program, micro-code or whatever, would need to be updated to change account numbers. This is only one simple problem.
There are many others. I don't mean to discourage such a project, but what I am trying to point out is that it is not as trivial as it
might sound 22f

22g I can sympathize with the file clerking operations necessary
to maintain an orderly file system. Currently, every evening a daemon runs on the DMS, indexes, all messages I have received or sent the previous day by the following fields: To, From, Blind Carbon Copy, Carbon Copy, Keyword, Filed-under, Message ID, References, Reply To, Sender and Date and inserts the messages into
a data base. An Information Retrieval System is available which allows retrieval using the indices. I have found it very useful. Our programming system, including the Information Retrieval System, 22g

22h PAGE 2 22h

22i is now operation on ISI. Would one or two of you like your own
private indexing, filing and retrieval system for your messages? Any takers? The IRS won't be integrated into the reader as it is on
the DMS but I think it still might prove useful. Also, you may have
to manually start the index job until it is made an autostart job (a
trivial operation). 22i

22j There are a number of people who are participating in this discussion who probably heard of the DMS message system. Therefore,
I am sending by US Mail to Faber, Steffenrud, Tasker, Walker and Baran copies of some of the documentation on the DMS message system.
If anyone else wants a copy, send message me a request. 22j

22k Let me cast my vote for not using a conferencing system and for staying with message systems as a means for communication, mainly because the message systems performed a rendezvous so nicely and I don't know of a conferencing system that performs the rendezvous well yet. For those of you using low speed terminals, I apologize for being so long winded. 22k

221 Steve, as you no doubt discovered, I already have an account on ISI. 221

22m A1 22m

Some Recent Dialog among the Message Service Committee

(J32806) 23-JUN-75 11:31;;;; Title: Author(s): Richard W. Watson/RWW; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RWW; Origin: < WATSON, NEWMESS.NLS;2, >, 23-JUN-75 07:26 RWW ;;;;####;

1 32806 Distribution

1a Harvey G. Lehtman, James C. Norton, Jeffrey C. Peters, Dirk H. Van Nouhuys, Kenneth E. (Ken) Victor, Richard W. Watson, Don I. Andrews, 1b Laura J. Metzger, Karolyn J. Martin, Jan A. Cornish, Larry L. Garlick, Priscilla A. Wold, Pamela K. Allen, Delorse M. Brooks, Beverly Boli, Rita Hysmith, Log Augmentation, Joseph L. Ehardt, Raymond R. Panko, Susan Gail Roetter, Robert Louis Belleville, Rene C. Ochoa, Ann Weinberg, Joan Hamilton, Adrian C. McGinnis, Robert S. Ratner, David S. Maynard, Robert N. Lieberman, Sandy L. Johnson, James H. Bair, Jeanne M. Leavitt, Rodney A. Bondurant, Jeanne M. Beck, Marcia L. Keeney, Elizabeth K. Michael, Jonathan B. Postel, Elizabeth J. Feinler, Kirk E. Kelley, N. Dean Meyer, James E. (Jim) White, Douglas C. Engelbart, Martin E. Hardy, J. D. Hopper, Charles H. Irby

1 ISI/7507

2

3 Display(DNLS) Terminals

4

5

6 IS

7

8 1. At this time ISI has a total of three DNLS terminals (IMLACs), 21 TTY Type Terminals (Execuport and TI), and five Typewriter Terminals (TYCOMs) under its direct control for use on the NLS System. Other terminals such as the Terminet 300, under the control of ISF, are also being used on NLS, and our TTY Terminals, being very versatile, are also used for GCOS and Multics. The TYCOM Terminals have been used exclusively for NLS and off-line typing, but can be used to output Multics.

9

10 2. We would like to change the mix of DNLS and TTY type terminals by increasing the number of DNLS Terminals to 23 for the Division and to 19 for the Branch. It is my understanding that an independent assessment is being made for ISC and ISF so I will address only the requirements for IS and ISI.

11

12 3. Expanding the NLS user population to include ISIS will require additional terminals. An analysis of the user population in IS and ISI, the room configuration and user statistics reveals the need for 20 DNLS workstations. We currently have only three DNLS Terminals(IMLACs), leaving 17 to be purchased. They would be allocated as follows:

IS	1	
ISI	3	(includes the PSO)
ISIM	1, 3, 3, 2	(4 rooms)
ISIS	1, 3, 3	(3 rooms)

13

14 4. The current distribution of displays, TTY's, and Typewriter terminals within IS and ISI is:

Terminals

	TTY	DNLS	Type-	Terminet	Other	
IS	2		1			
ISI	3	1	2			
ISIM	9	2	1	1		
ISIS	1		1	3	1	14
15						15

16 5. The current complement of terminals is heavily biased toward TTY's. Even though the superiority of DNLS Terminals was clearly recognized at the time of purchase, display terminals were approximately five times as expensive as TTY's. Since our involvement in NLS was experimental and evaluative, the DNLS Terminals could not be justified in terms of cost effectiveness in the daily work of our people. Since then however, the cost of DNLS workstations has decreased and they are now only 50% more expensive than TTY's. 16

17 17

18 6. Effective and efficient use of NLS is closely correlated with the availability of display (DNLS) workstations. DNLS is easier to learn, easier to use and offers superior editing and viewing facilities. The DNLS user can do much more in less time than the TTY user, and the quality of his work is better. This increases productivity and improves performance at no extra cost for the use of the computer, which is by far the most expensive single item in the system. 18

19 19

20 7. Because of the superior performance and competitive cost of DNLS, the TTY's should be replaced with display workstations. This replacement would have a bonus effect inasmuch as it would make the TTY's, which we already own, available for use with MULTICS and GCOS. 20

21 21

22 8. Almost any commercially available CRT that has addressable cursor can now be used to make a DNLS workstation. The best choice is the Datamedia 2500 which is compatible with NLS and Multics over the ARPANET using a "line processor", and with GCOS using a direct line or a telephone. SRI has already developed a line processor, which allows the interface of CRT, "mouse", keyset, and communications line. Other devices for special applications can also be interfaced to the line processor; such as a graphics terminal, local printer or cassette recorder. 22

23 23

Terminals

9. I propose to procure ten DNLS Displays this year and another ten next year. Of the ten one would be for use in the Division office, one for ISIS to replace the Beehive stolen from John McLean, two for the PSO which is beginning to function in support of the other Brancnes as well as IS and ISIM. The remaining six would go to ISIM for use by scientific and technical personnel. This would free eight TTY Terminals. Four of these would go to ISIS, for use on NLS, Multics and GCOS. The other four would be turned over to ISF for redistribution to other users or to replace four of the leased Terminets.

The distribution would then be:

	TOTAL	TTY	DNLS	Type-	Terminet	Other
IS	4	2	1	1		
ISI	6	1	3	2		
ISIM	13	3	8	1	1	
ISIS	11	5	1	1	3	1
TOTAL	34	11	13	5	3	1

10. Terminal availability is a key factor in motivation to use the systems. If this plan is followed it will result in 9 DNLS terminals and 8 TTY terminals for 34 engineers in the two Sections of the ISI branch; or a 1:2 ratio of terminals to engineers. Including the Terminets that are presently available the ratio will be higher. This ratio should be considered in the light of past experience which has shown that there are generally 1-3 terminals unavailable at any given time, either because they're in the shop for maintenance or some one has borrowed them for other use.

FRANK J. TOMAINI

Chief, Information Processing Branch

Terminals

(J32807) 23-JUN-75 13:23;;;; Title: Author(s): Edmund J. Kennedy/EJK; Distribution: /ELF([ACTION] Just in case it might come up again) ; Sub-Collections: RADC; Clerk: EJK; Origin: < KENNEDY, TERMINALS-OLD,NLS;1, >, 21-MAY-75 13:38 EJK ;;;;

####;

Format - Memo

1 This is a simple minded model that will produce a letter or memo that can be printed out on a TYCOM. Copy it into your directory, and edit it. Don't pay any attention to this statement, your memo will start at the next visible statement. This will print out but, on Page 0, which will be discarded.

EJK 23-JUN-75 13:42 32808

Format - Memo

2 ISI/7507 2

3 3

4 your subject 4

5 5

6 6

7 IS 7

8 8

9 1. Type in your own text to replace this. 9

10 10

11 2. Type in your own text to replace this. 11

12 12

13

13

14 FRANK J. TOMAINI 14

15 Chief, Information Processing Branch 15

EJK 23-JUN-75 13:42 32808

Format - Memo

(J32808) 23-JUN-75 13:42;;;; Title: Author(s): Edmund J. Kennedy/EJK; Distribution: /SLR([ACTION]) ; Sub-Collections: RADC; Clerk: EJK;

RA3Y 23-JUN-75 14:27 32809

Request for Use Statistics

1 It will be Thursday or Friday before Tymshare will deliver all of the data you asked for. Usually, they deliver data weekly, with a one-week delay. As soon as we get the data from Tymshare, we will send it along to you. Your analysis sounds interesting. If possible, may I have a copy of your results? 1

Request for Use Statistics

(J32809) 23-JUN-75 14:27;;;; Title: Author(s): Raymond R. Panko/RA3Y; Distribution: /MEJ([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RA3Y;

JHB 23-JUN-75 15:21 32810

New person in Applications

1 Laura Metzger has joined the Applications staff as of today (Mon. 23 June). She will be assisting in the Applications Development Group, primarily as an instructional documentation writer. (Applications Development is repsonsible for all the courses, user-system documentation, application development support, etc. for Utility Clients.) She hails from Cleveland Ohio, attended Case Western Reserve U., and currently lives with her husband John in Mountain View. 1

JHB 23-JUN-75 15:21 32810

New person in Applications

(J32810) 23-JUN-75 15:21;;;; Title: Author(s): James H. Bair/JHB;
Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: JHB;

1 32810 Distribution

1a Harvey G. Lentman, James C. Norton, Jeffrey C. Peters, Dirk H. Van Nouhuys, Kenneth E. (Ken) Victor, Richard W. Watson, Don I. Andrews,
1b Laura J. Metzger, Karolyn J. Martin, Jan A. Cornish, Larry L. Garlick, Priscilla A. Wold, Pamela K. Allen, Delorse M. Brooks, Beverly Boli, Rita Hysmith, Log Augmentation, Joseph L. Ehardt, Raymond R. Panko, Susan Gail Roetter, Robert Louis Belleville, Rene C. Ochoa, Ann Weinberg, Joan Hamilton, Adrian C. McGinnis, Robert S. Ratner, David S. Maynard, Robert N. Lieberman, Sandy L. Johnson, James H. Bair, Jeanne M. Leavitt, Rodney A. Bondurant, Jeanne M. Beck, Marcia L. Keeney, Elizabeth K. Michael, Jonathan B. Postel, Elizabeth J. Feinler, Kirk E. Kelley, N. Dean Meyer, James E. (Jim) White, Douglas C. Engelbart, Martin E. Hardy, J. D. Hopper, Charles H. Irby

JHB 23-JUN-75 18:06 32811

Clarification of Links vs. Addresses in TNLS training

One of the most difficult things to teach about NLS usage are links. We have finally completely revised the section that deals with links, and settled upon a clear differentiation between the concepts, link and address. As you will note from this course excerpt, links are defined as addresses that appear in text. Operationally, this will work when the next version of NLS8 comes up with the bug fix (JDH) that will make viewspecs in addresses take affect whenever logical. Consequently, links will not be addresses plus viewspecs, they will be addresses that reside in a statement.
I'd like any comments before I publish the next course (on both the issue and the teaching strategy).

Clarification of Links vs. Addresses in TNLS training

1 This excerpt from the Master Course file is the last subsection in the section on addressing. The numbers in parens are taken to be statement names which are turned off for printing, refer to the course level for each statement and are used to filter out the statements for higher level courses. For the context of this section, see -- 32608,), The Intermediate TNLS Course. 1

2 ADDRESSING BETWEEN FILES AND DIRECTORIES: 2

2a (2) To address another file in your directory, you need to add the FILENAME, to the addresses within a file. To address a file in another user's directory, you need to add their DIRECTORY, name as well as the filename. Note that they must be followed by commas.

[These may be used after A: in any command] 2a

2b (2) To address another file: 2b

2b1 (2) A: FILENAME,ADDRESS OK 2b1

2c (2) To address another user's file: 2c

2c1 (2) A: DIRECTORY,FILENAME,ADDRESS OK
[e.g.: Copy Branch (from) BAIR,JHB,1 OK (to) 3a OK] 2c1

2d (3) You may add VIEWSPECS in an Address field in any of the above cases: 2d

2d1 (3) A: ADDRESS:VIEWSPECS OK 2d1

2d1a (3) [Note that it is necessary to precede Viewspecs with a colon] 2d1a

2e (4) You may add a CONTENT ANALYZER pattern in an Address field in any of the above cases: 2e

2e1 (4) Print STRUCTURE (at) ADDRESS:VIEWSPECS;["CONTENT"]; OK 2e1

2e1a (4) Include the viewspec "i" to turn the filter on at the new location. 2e1a

2f LINKS: special forms of text that may be used as addresses. 2f

2f1 (2) Characteristics of Links: 2f1

2f1a (2) -- any logical Address 2f1a

2f1b (2) -- must be surrounded by parentheses (or angle brackets < >) 2f1b

2f1c (2) -- it is in a statement rather than typed in after the A: 2f1c

2f1c1 (4) The Jump to Link command and Load File use a T: which essentially means the same thing as A: 2f1c1

2f1d (2) -- it may include viewspecs that will take effect at the new address 2f1d

2f1e (2) -- must be in one of the following forms: 2f1e

2f1e1 (2) <DIRECTORY,FILENAME,ADDRESS:VIEWSPECS> 2f1e1

2f1e2 (2) [without optional Viewspecs:] <DIRECTORY,FILENAME,ADDRESS> 2f1e2

2f1e3 (2) [or in current directory:] <FILENAME,ADDRESS> 2f1e3

2f1e4 (2) [or in current file:] <ADDRESS> 2f1e4

2f1e5 (3) [or:] <:VIEWSPECS> [only the viewspecs will be changed] 2f1e5

2f2 (2) To use a link give the Statement Address and the letter l preceded by a period: 2f2

2f2a (3) Jump (to) Address STATEMENT ADDRESS .l OK 2f2a

2g (4) TO JUMP USING A LINK: 2g

2g1 (4) Jump (to) Link CONTENT OK [Note: optionally allows the use of ADDRESS of the LINK to be taken] 2g1

2g2 (d) Jump (to) Item DESTINATION VIEWSPECS OK 2g2

2g3 (d) Jump (to) Address (relative to) DESTINATION ADDRESS VIEWSPECS OK 2g3

2g4 (d) Jump (to) BUG VIEWSPECS OK 2g4

2h (2) TO GO BACK TO PREVIOUS FILES: 2h

2h1 (2) Jump (to) File Return OK ANSWER OK
(type an N for ANSWER - next filename
in stack will be echoed; repeat for file before that) 2h1

2h2 (4) Jump (to) File BUG VIEWSPECS OK 2h2

JHB 23-JUN-75 18:06 32811

Clarification of Links vs. Addresses in TNLS training

(J32811) 23-JUN-75 18:06;;;; Title: Author(s): James H. Bair/JHB; Distribution: /ARC-APP([ACTION]) DCE([INFO-ONLY] you might have special interest?) ARC-DEV([INFO-ONLY]) ; Sub-Collections: SRI-ARC ARC-APP ARC-DEV; Clerk: JHB; Origin: < BAIR, LINKS.NLS;8, >, 23-JUN-75 16:50 JHB ;;;; TNLS COURSE MASTER FILE EXCERPT####;

1 32811 Distribution

1a Harvey G. Lehtman, Kirk E. Kelley, Charles H. Irby, Joseph L. Ehardt, Robert Louis Belleville, Don I. Andrews, Richard W. Watson, Douglas C. Engelbart,

1b Laura J. Metzger, Priscilla A. Wold, Pamela K. Allen, Joan Hamilton, Rene C. Ochoa, Jeffrey C. Peters, Marcia L. Keeney, Jeanne M. Beck, Geoffrey S. Goodfellow, Rodney A. Bondurant, Douglas C. Engelbart, Jeanne M. Leavitt, Susan Gail Roetter, Raymond R. Panko, Adrian C. McGinnis, James C. Norton, J. D. Hopper, Elizabeth J. Feinler, James H. Bair, Robert N. Lieberman, N. Dean Meyer, Sandy L. Johnson, Martin E. Hardy, Douglas C. Engelbart, Jan A. Cornish, Larry L. Garlick, Delorse M. Brooks, Beverly Boll, James E. (Jim) White, Ann Weinberg, Kenneth E. (Ken) Victor, Dirk H. Van Nouhuys, Jonathan B. Postel, Elizabeth K. Michael, David S. Maynard, Karolyn J. Martin

1 We are only practicing 1

PKA 24-JUN-75 10:14 32815

(J32815) 24-JUN-75 10:14;;;; Title: Author(s): Pamela K. Allen/PKA;
Distribution: /SGR([ACTION]) PAW2([ACTION]) BEV([INFO-ONLY])
; Sub-Collections: SRI-ARC; Clerk: PKA;

1 32815 Distribution
1a Susan Gail Roetter, Priscilla A. Wold, Beverly Boli,

NDM 24-JUN-75 12:47 32816

Contact Report: Jay Shuler

Jay Shuler Co publishes the Arabian Horse magazine, interested in computerized typography

NDM 24-JUN-75 12:47 32816

Contact Report: Jay Shuler

1 Herb Holden (SRI) brought by two gentlemen for a quick demo: 1

1a Jay Shuler, Jay Shuler Co, Inc 1a

1a1 815 San Antonio Rd, PA 1a1

1a2 494-7806 1a2

1a3 designing programs using graphic page displays 1a3

1b Wayne Girard, Tektronix 1b

1b1 3200 Coronado Dr, Santa Clara 1b1

1b2 (408) 249-5500 1b2

2 Jay Shuler publishes the Arabian Horse magazine. He is set up for high quality type setting and publication. 2

2a He is interested in computerizing the typography, including local proofing and format editing. He is considering developing the software on a mini, to interface to his typesetting equipment. 2a

2b I gave them a quick run through of the online environment, and then discussed our interface to COM and a bit about the Output Processor. 2b

3 They seemed interested in pursuing it, and may invite Herb and an ARC person to visit the San Antonio plant. 3

Contact Report: Jay Shuler

(J32816) 24-JUN-75 12:47;;;; Title: Author(s): N. Dean Meyer/NDM;
Distribution: /DCE([INFO-ONLY]) JCN([INFO-ONLY]) RLL([
INFO-ONLY]) DVN([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk:
NDM; Origin: < XPROGRAMS, VISIT,NLS;3, >, 24-JUN-75 12:45 NDM
;;;;####;

1 32816 distribution
1a Douglas C. Engelbart, James C. Norton, Robert N. Lieberman, Dirk H. Van Nouhuys,