25NOV70 WLB 5420

MEMO TO MICHAEL S. SHER RE SHARING OF
NETWORK RESOURCES (ARC Reply to NIC 4997)

Current activity at the SRI Augmentation Research Center (ARC) is concentrated in three major areas. 1

We are continuing the evolutionary development of our display-oriented On-Line System, NLS, and of its typewriter-oriented version, TODAS. A major aspect of this effort over the past few years has been a steady process of increasing the service capacity of our computer systems. 1a

During the current year we have added 32K of external core storage to the system and have acquired faster swapping drums, with a resulting, substantial increase in the number of users we can handle with good command response times. 1a1

At the present time we are engaged in transfering our operational user systems from our XDS 940 to a new PDP 10. When the transfer has been completed this winter, we anticipate realizing another substantial increase in user-service capacity. 1a2

Evolution of our long-term goals and strategy has resulted in the shifting of our research emphasis from the augmentation of individual intellectual workers to the augmentation of problem-solving teams of augmented individuals. 1b

One major aspsect of this new line of research is the development of new tools and techniques for fostering effective goal-directed, collaborative dialogue among persons working at remote locations from each other. 1b1

Much of our participation in the Network experiment, in terms both of the resources which we will be able to make available to other Network participants and of the resources which we will seek to obtain through the Network, will be directed towards the study of distributed dialogue. 1b2

Our third major project activity at the present time is the design and implementation of services, both on-line and off-line, to support the Network Information Center (NIC) which we are operating for ARPA. 1c

In response to the specific survey questions: 2

1. We foresee using the Network in the following ways: 2a

a. As a medium for providing NIC services to the other Network participants. 2a1

b. As a laboratory for carrying out experiments in the support of distributed dialogue among Network affiliates. 2a2

c. As a medium for accessing a large archival file storage, if this is available at any site. 2a3

d. As a medium for accessing large data-base management services, if available at any site. .GRB=8; 2a4

2. As soon as we have completed transfer of our on-line systems to the PDP 10, we will be offering access to TODAS for on-line documentation experimentation and eventually service. 2b

In addition to providing access to TODAS, we will offer a growing line of special NIC services, such as catalog querying, archival file retrieval, and on-line message composition and distribution (see NIC 4792). .GRB=10; 2b1

3. Our IMP is connected and operational. 2c

We have been making experimental use of the Network to access the PDP 10 at UTAH for the purpose of debugging programs in preparation for transfer to our own PDP 10. 2c1

Our PDP 10 will use the standard TENEX Network Control Program being developed at BBN, and we will be able to offer Network access to our on-line services as soon as our PDP-10 system is operational early in 1971. 2c2

Additional discussion of the topics outlined above will be found in our last two project final reports which are available in you NIC Site Collection as NIC 5139 and NIC 5140. 3

```
:5420, 12/01/70 1042:08 JCN ; .DPR=1; :5420, 11/24/70 1719:06 WLB ;
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MEMO TO MICHAEL S. SHER RE SHARING OF
NETWORK RESOURCES (ARC Reply to NIC 4997)";
.SNF=72;.SCR=2;.COD/21B/=114B;.MCH=65;.PGN=0;.SNB=0;.DPR=0;.PES;
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02DEC70 WLB 5607

MEMO TO SITE LIAISON AGENTS RE SHER
SURVEY OF NETWORK RESOURCES

Prof. Michael Sher at UILL has been conducting a preliminary survey of Network sites to identify present and future Network-related resources and has agreed to make any information he receives available to the other Network sites. 1

A summary of the information received so far is in preparation and will be distributed by NIC when it becomes available. In the meantime, copies of all replies received by Prof. Sher are being sent to each site's R&C Station Agent for integration into the Site Collections, and you may wish either to refer to these documents yourself or to inform other interested persons at your site of their availability. 1a

Sites which have not yet responded to Prof. Sher's request for information still have time to contact him before completion of the survey summary. 1b

The following is a list of survey-related documents which have been sent for incorporation into the Site Collections. 2

4997 Initial letter from Prof. Sher requesting information 2a

5157 UCLA reply 2b

5158 LINC reply 2c
4279 Semiannual Tech. Summary Report to ARPA (1/7/70) 2c1
4978 Quarterly Letter Report to ARPA (6/31/70) 2c2

5164 BBN reply 2d
5165 Final Report to ARPA (9/30/70) 2d1

5168 UCSB reply 2e
5169 "UCSB's Current Network Status" (10/5/70) 2e1
5170 "A Brief Description of the UCSB (Culler-Fried) On Line System" (10/1/69) 2e2
5171 "Computer Center Guide" 2e3

5175 SUAI reply 2f
5159 Project Technical Report, April 1970 2f1

5176 MITR reply 2g

5179 RAND reply 2h
5606 Supporting document 2h1

5197 SDC reply 2i

5408 CMU reply 2j

5420 ARC reply 2k

5514 MAC reply 2l

:5607, 12/03/70 1654:44 JCN ; :5607, 12/02/70 1159:41 WLB ;

Advanced Research Projects Agency ARPA 1

1400 Architect Building 1a

Arlington, Virginia 22209 1b

Principal Investigator 1b1

Dr. Lawrence G. Roberts 1b1a

Tel.: (202) 694-5921
694-5922 1b1a1

Network Liaison 1b2

xxxx 1b2a

Tel.: 1b2a1

Station agent 1b3

Margaret Goering 1b3a

Tel.: (202) 694-5921
694-5922 1b3a1

1b3a2

Bolt, Beranek & Newman, Inc. BBN 2

50 Moulton Street 2a

Cambridge, Mass. 02138 2b

Principal Investigator 2b1

Dr. Daniel Bobrow 2b1a

Tel.: (617) 491-1863 2b1a1

Network Liaison 2b2

xxxx 2b2a

Tel.: 2b2a1

Station agent 2b3

xxxx 2b3a

Tel.: 2b3a1

2b3a2

Carnegie-Mellon University	CMU	3
Computer Science Department		3a
Schenley Park		3b
Pittsburgh, Pa. 15213		3c
Principal Investigator		3c1
Prof. Alan J. Perlis		3c1a
Tel.: (412) 621-2600		3c1a1
Network Liaison		3c2
Harold R. Van Zoeren		3c2a
Tel.: (412) 683-7000 ext.267		3c2a1
Station agent		3c3
Carolyn Lisle		3c3a
Tel.: (412) 683-7000 ext.269		3c3a1
		3c3a2

Case Western Reserve University	CASE	4
10900 Euclid Avenue		4a
Cleveland, Ohio 44106		4b
Principal Investigator		4b1
Prof. Edward Glaser		4b1a
Computation Center		4b1a1
Tel.: (216) 368-2808		4b1a2
Network Liaison		4b2
xxxx		4b2a
Tel.:		4b2a1
Station agent		4b3
xxxx		4b3a
Tel.:		4b3a1
		4b3a2

Harvard University	HARV	5
Aiken Computation Laboratory		5a
Cambridge, Mass. 02138		5b
Principal Investigator		5b1
Prof. T. E. Cheatham, Jr.		5b1a
Tel.: (617) 495-1000		5b1a1
Network Liaison		5b2
Robert Sundberg		5b2a
Tel.: (517) 495-4147		5b2a1
Station agent		5b3
Robert Sundberg		5b3a
Tel.: (617) 495-4147		5b3a1
Alternate: Bradley Reaussow		5b3a2
Tel.: (617) 495-4147		5b3a3
		5b3a4
		5b3b

Massachusetts Institute of Technology, Lincoln Laboratory LINC 6

244 Wood Street 6a

Lexington, Mass. 02173 6b

Principal Investigator 6b1

James Forgie 6b1a

Tel.: (*P*T) (617) 862-5500 ext. 6b1a1

Network Liaison 6b2

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Tel.: (617) 862-5500 ext.7474 6b2a1

William Kanterowitz (for the TX-2) 6b2b

Tel.: (617) 862-5500 ext.7349 6b2b1

Station agent 6b3

Carol Mostrom 6b3a

Tel.: (617) 862-5500 ext.7177 6b3a1

6b3a2

Massachusetts Institute of Technology, Project MAC MAC 7

545 Technology Square 7a

Cambridge, Mass. 02139 7b

Principal Investigator 7b1

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Network Liaison 7b2

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Station agent 7b3

Frances L. Yost 7b3a

Tel.: (617) 864-6900 ext.6026 7b3a1

7b3a2

Mitre Corporation	MITR	8
Information Systems Dept.		8a
Westgate Research Park		8b
MacLean, Virginia 22101		8c
Principal Investigator		8c1
Alfred H. Vorhaus		8c1a
Tel.: (703) 893-3500 ext.2321		8c1a1
Network Liaison		8c2
David Wood		8c2a
Tel.: (703) 893-3500 ext.2327		8c2a1
Alternate: Peggy Karp		8c2b
Tel.: (703) 893-3500 ext.2393		8c2b1
Station agent		8c3
David Wood		8c3a
Tel.: (703) 893-3500 ext.2327		8c3a1
Alternate: Peggy Karp		8c3b
Tel.: (703) 893-3500 ext.2393		8c3b1
		8c3b2

Rome Air Development Center (ISIM)	RADC	9
Griffiss Air Force Base		9a
Rome, N.Y. 13440		9b
Principal Investigator		9b1
xxxx		9b1a
xxxx		9b1a1
Network Liaison		9b2
Thomas Lawrence		9b2a
Tel.: (315) 330-3857 (351) 330-7834		9b2a1
Alternate: Duane Stone		9b2b
Tel.: (315) 330-3857 (351) 330-7834		9b2b1
Station agent		9b3
Marcelle Petell		9b3a
Tel.: (315) 330-4254 (351) 330-4230		9b3a1
Alternate: Josephine Stellato		9b3b
Tel.: (315) 330 3827 (351) 330 2672		9b3b1
		9b3c

Stanford Research Institute, Artificial Intelligence Group SRAI 10

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Tel.: (415) 326-6200 ext.4576 10b2a1

Station agent 10b3

Rilla Reynolds 10b3a

Tel.: (415) 326-6200 ext.4618 10b3a1

10b3a2

Stanford Research Institute, Augmentation Research Center ARC 11

333 Ravenswood Avenue 11a

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Network Liaison 11b2

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Station agent 11b3

Cindy Page 11b3a

Tel.: (415) 326-6200 ext.3007 11b3a1

11b3a2

Stanford University, Computation Center	SUAI	12
Stanford, Calif. 94305		12a
Principal Investigator		12a1
Prof. John McCarthy		12a1a
Tel.: (415) 321-2300 ext.4430		12a1a1
Network Liaison		12a2
James A. (Andy) Moorer		12a2a
Tel.: (415) 321-2300 ext.4971		12a2a1
Station agent		12a3
Barbara Barnett		12a3a
Artificial Intelligence Project		12a3a1
D.C. Power Lab		12a3a2
Stanford, California		12a3a3
Tel.: (415) 321-2300 ext.2600 or 4971		12a3a4
		12a3a5

System Development Corporation	SDC	13
2500 Colorado Avenueic		13a
Santa Monica, Calif. 90406		13b
Principal Investigator		13b1
Clark Weissman		13b1a
Tel.: (213) 393-9411 ext.533		13b1a1
Network Liaison		13b2
Abe Landsberg		13b2a
Tel.: (213) 393-9411 ext.454 or 6119		13b2a1
Station agent		13b3
Judith C. Needham		13b3a
Information Processing Information Center		13b3a1
Tel.: (213) 393-9411 ext.6187		13b3a2
		13b3a3

The Rand Corporation	RAND	14
Computer Science Department		14a
1700 Main Street		14b
Santa Monica, Calif. 90406		14c
Principal Investigator		14c1
Keith W. Uncapher		14c1a
Tel.: (213) 393-0411 ext.433		14c1a1
Network Liaison		14c2
John Heafner		14c2a
Tel.: (213) 393-0411 ext.7606		14c2a1
Alternate: Eric Harslem		14c2b
Tel.: (213) 393-0411 ext.7320		14c2b1
Station agent		14c3
Helen Sinnis		14c3a
Tel.: (213) 393-0411 ext.635		14c3a1
		14c3a2

University of California at Los Angeles	UCLA	15
Computer Science Department		15a
3732 Boelter Hall		15b
Los Angeles, Calif. 90024		15c
Principal Investigator		15c1
Prof. Leonard Kleinrock		15c1a
Tel.: (213) 825-2543		15c1a1
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Tel.: (213) 825-2381		15c2a1
Station agent		15c3
Anita Coley		15c3a
Tel.: (213) 825-4797		15c3a1
		15c3a2

University of California at Santa Barbara	UCSB	16
Santa Barbara, Calif. 93106		16a
Principal Investigator		16a1
Dr. David O. Harris		16a1a
Dept. of Chemistry		16a1a1
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Network Liaison		16a2
James White		16a2a
Tel.: (805) 961-2274		16a2a1
Station agent		16a3
Elizabeth Gibson		16a3a
Computer Research Laboratry		16a3a1
Tel.: (805) 961-3221		16a3a2
		16a3a3

University of Illinois	ILL	17
Center for Advanced Computation		17a
168 Engineering Research Laboratory		17b
Urbana, Illinois 61801		17c
Principal Investigator		17c1
Prof. Daniel L. Slotnik		17c1a
Tel.: (217) 333-0925		17c1a1
Network Liaison		17c2
James Madden		17c2a
Tel.: (217) 333-0395		17c2a1
Station agent		17c3
Nan Brown		17c3a
Tel.: (217) 333-7161		17c3a1
Tel.: (217) 333 1436 temporary until about 1/1/71		17c3a2
		17c3a3

University of Utah	UTAH	18
Computer Science/IRL		18a
Salt Lake City, Utah 84112		18b
Principal Investigator		18b1
Prof. David Evans		18b1a
Tel.: (801) 322-8224		18b1a1
Network Liaison		18b2
Barry D. Wessler		18b2a
Tel.: (801) 322-8378		18b2a1
Station agent		18b3
Nancy Bruderer		18b3a
Tel.: (801) 322-8224		18b3a1
		18b3a2

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Record of visit at ARC/NIC by John LeGates, Thurs, 3 Dec 70

He's now with EDUCOM, as Director of its Educational Information Network (EIN): 1

100 Charles River Plaza, Boston Mass 02114 1a

(617) 227-1805 1b

Where EDUCOM/EIN is now: 2

Network became operational about a year ago. 2a

Software runs "where it is" 2a1

Have a catalog of software, and make catalog available 2a2

75 members now (from 55 a year ago) 2a3

Mail-communication originally, but uage small, apparently because mails slow. 2a4

Getting people to "list" their facility -- so that a remote person can dial up and be as a local user -- seems to improve matters. 2a4a

They contacted Larry, who apparently is "interested" in net users "in search of a network". 2b

So, suppose EDUCOM/EIN were to be considered. John now looking for: 2c

What is ARPA network now, 2c1

Projection of what would happen if EDUCOM people were to become users. 2c2

Promotion needed, to develop participation 2c2a

Disseminate materials 2c2b

Billing and accounting 2c2c

Etc. 2c2d

Specific features of their operation: 3

EDUCOM EIN gets the bills, and bills the customers. 3a

Record of visit at ARC/NIC by John LeGates, Thurs, 3 Dec 70

EIN gets copies of transactions. 3b

Takes about 25 man hours, over about two months, to produce the documentation on each program. 3c

Final last pass on editing done by the site. 3d

EDUCOM has about 300 members 3e

EIN sometimes attracts people who aren't interested in the parent organization (in EDUCOM). 3e1

UCs not been very active (they have catalogs) 3f

John Starkweather, San Francisco, UC 3f1

Ken Hebert at Berkeley 3f2

John says he may be here in late Dec (to talk with Steve Crocker), else mid Jan is earliest. 4

If any of us would be in Boston, should sit down with their head editor. (An invitation) 5

What are the possibilities for ARC and EIN to join forces? 6

John says Larry appeared to be interested. 6a

Larry talking about adding ten, to twenty, EDUCOM nodes onto the ARPA Network -- in five years? 6b

Like, they (EIN, via the Network) could have access to our tools to do their work, and perhaps provide some ARPA-Net documentation support. 7

They have sort of an "expanable-staff" mode, using MIT EE Juniors, who seem to be able to productively "get in gear" within a few weeks. 7a

It would be interesting anyway for us to consider adopting the EIN Documentation Standard. 8

Suppose they got linked in so that they could use NLS/TODAS (GODAS, too): 9

Could we siphon some funds toward them to get documentation

Record of visit at ARC/NIC by John LeGates, Thurs, 3 Dec 70

done? (NIC couldn't now, with current commitments and funding level) 9a

How much of ARC/NIC computer resource would be consumed by their editing and publishing (and index generation, etc.), if they were to do it all (for EIN as well as for ARPA Net) this way? If they were just to do ARPA-Net work this way? 9b

How much value, to the later integration of some part of their clintele into the ARPA Network, would it be for the EIN staff to have been active on the Network? 9c

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Record of visit at ARC/NIC by John LeGates, Thurs, 3 Dec 70 ";
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Letter: DC Engelbart to John LeGates, EDUCOM/EIN 4 DEC 70

Dear John: 1

I am very pleased that we have met, and that there are prospects for future collaboration between our organization, and between us. 2

I am enclosing some of our publication material: 3

OSR-1 (1962), FJCC reprint (1968), RADC Report (1970) and NASA Report (1970), plus a copy of our publications bibliography. 3a

Also, you might remember that I recorded notes of our discussion: remember that I sent them to the printer before we finished? We forgot to pick up the printout. This morning I extracted those notes and made them into a "Journal entry," so that now we have it as a catalogued and retrievable information item (5610,). I'm including a copy of that Journal item for your information. 4

I will call you next week, so that after some incubation and digestion we can make a next step toward establishing possibilities for collaboration. 5

You left three documents: 6

EDUCOM: EIN Project "Documentation Standards Handbook for EIN Software Catalog," June 1969, our ref (5439,); EDUCOM, "Member Institutions of EDUCOM," 14 July 1970, our ref (5438,); and a sample program-description document (your number 000 0051(q)), our ref (5437,). 6a

Would you have other publications available that would be worth our putting into our collection -- for our internal use and/or for ARPA Network access through NIC? 6b

I'll be looking forward to our further dialogue. 7

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Letter: DC Engelbart to John LeGates, EDUCOM/EIN       4 DEC 70 ";
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.DIR=0;       .DPR=0;
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SHER NETWORK RESOURCE SURVEY RESPONSES
TRANSMITTED TO SITES 4 DECEMBER 1970

4279 Massachusetts Institute of Technology
Lincoln Laboratory
Graphics, Semiannual Technical Summary Report to the Advanced
Research Projects Agency
November 1969

1

4978 Massachusetts Institute of Technology
Lincoln Laboratory
Graphics, Quarterly Letter Report to ARPA
31 August 1970
James W. Forgie

2

4997 University of Illinois at Urbana-Champaign
ILLIAC IV PROJECT
(Request for information on site resources)
26 August 1970
Michael S. Sher

3

5157 University of California at Los Angeles
School of Engineering and Applied Science
(UCLA response to Sher resource survey)
22 September 1970
Jon Postel

4

5158 Massachusetts Institute of Technology
Lincoln Laboratory
(LINC response to Sher resource survey)
3 September 1970
Jack L. Mitchell

5

5159 Stanford University
Stanford Artificial Intelligence Project
Project Technical Report
April 1970
John McCarthy

6

SHER NETWORK RESOURCE SURVEY RESPONSES
TRANSMITTED TO SITES 4 DECEMBER 1970

5164 Bolt Beranek and Newman Inc
Computer Science Division
/BBN response to Sher resource survey/
15 September 1970
Daniel G. Bobrow

7

5165 Bolt Beranek and Newman Inc
Computer Science Division
Natural Communication With Computers III, Draft of Final Report
30 September 1970
Daniel G. Bobrow

8

5168 University of California at Santa Barbara
Computer Center
/UCSB response to Sher resource survey/
16 October 1970
Charles R. Loepkey

9

5169 University of California at Santa Barbara
Computer Center
UCSB's Current Network Status
5 October 1970
Charles R. Loepkey

10

5170 University of California at Santa Barbara
Computer Center
A Brief Description of the UCSB (Culler-Fried) On Line System
1 October 1970
Charles R. Loepkey

11

5171 University of California at Santa Barbara
Computer Center
Computer Center Guide, UCSB
1970

12

SHER NETWORK RESOURCE SURVEY RESPONSES
TRANSMITTED TO SITES 4 DECEMBER 1970

SHER NETWORK RESOURCE SURVEY RESPONSES
TRANSMITTED TO SITES 4 DECEMBER 1970

5606 Rand Corporation
/Supporting Document/
/October 1970/
John F. Heafner

20

5607 Stanford Research Institute
Augmentation Research Center
Re Sher Survey of Network Resources
30 November 1970
Walt Bass

21

:5613, 12/07/70 1657:37 JCN ; .DPR=1; :SAVE, 12/04/70 1429:46 JCN ;
.DPR=0;

07DEC70 DCE 5614

Letter: D.C. Engelbart to George Dobbs, GM Research Laboratory

Dr. George Dobbs
Computer Technology,
General Motors Corporation
Research Laboratories,
Warren, Mich. 4809 1

Dear George: 2

When we talked at FJCC, I told you about a movie that we had made, and which you might well find worth seeing. When I inquired about availabiliy here of a copy to send to you, I found that one has just been sent to a Pete Fisher, 6-217 GM Bldg, Detroit. It would save fuss and overhead and such if you could give him a call, and get it from him after he is through. 3

The movie is on three 33-minute reels of 16-mm black-and-white, with an optical sound track. Besides the content, you might well be interested in seeing how we used TV-video techniques for giving a presentation and making a movie -- this approach might be useful for you in giving presentations, or making educational or promotional movies of your on-line techniques. 4

The movie is an unedited record of an "on-line presentation" that our group made for the 1969 Annual Meeting of the American Socieity for Information Sciences (ASIS), in San Francisco. We leased two microwave links to the City from our lab, and used phone lines to connect console control and intercom. 4a

You might (possibly) remember that we use 875-line video to pipe our displays out to our consoles (in our lab); we have also acquired some standard equipment for switching, mixing, and frame-dividing the video. For our presentation, we borrowed an Eidophor video projector, which is an amazing device that projected an easily viewable, movie-bright image for our near-800 person audience. 4b

I sat at the front of the auditorium, at one of our working consoles. A PA sytem projected my voice, and the Eidophor projected my images -- images of my face, of my hands at the controls, and of the computer-generated displays I was causing -- as produced by a number of TV cameras and switced, mixed, split, etc. by Bill English at a control station at the back of the auditorium. We even switched in live camera shots of our lab in Menlo Park, and of people at consoles there who gave presentaions to the audience on special aspects of our

work. While they talked, various camera shots of them were projected for the audience to give the speakers a real "presence" in the auditorium, and these shots were intermixed and/or overlaid with the computer-generated images they were controlling as part of their presentation. 4c

Since the full prsentation was designed both to describe our work (goals, techniques, and the way we apply these techniques in our work) as well as to demonstrate how we do things, the movie record is the best thing we've found for communicating what is going on here. I truly hope that you can find time to see it. 5

It would seem to me very worthwhile if somehow the things that both of our groups are doing can begin to benefit from some direct dialogue betwen us. Toward this end, I am sending copies of our latest reports, and I will seriously try to work in a visit to your labs at some mutually convenient (or reasonably convenient) time. 6

My very best regards,

Douglas C. Engelbart, Manager
Augmentation Research Center
Stanford Research Institute
333 Ravenswood Avenue
Menlo Park, California 94025 7

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':5614', 12/08/70 1925:56 JCN ; .DPR=1; :JRNLP5614, 12/07/70 1010:10 DCE ;
.HED="                                                    07DEC70 DCE 5614

Letter: D.C. Engelbart to George Dobbs, GM Research Laboratory ";
|    .    |    .    2    .    3    .    4    .    5    .    6    .    7
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09DEC70 DCE 5615

Memo to Steve Crocker: NWG/RFC Distribution, and Special Net Roles

Steve: As you requested in yesterday's telephone conversation, I am sending a written response to your 23 Nov letter (5435,). 1

Item 1: Details regarding the distribution of Network Working Group/ Request For Comments (NWG/RFC's): 2

> Your Paragraph 3 read: "Jeanne North will be responsible for assigning a pair of numbers to each new NWG/RFC -- one a NIC number, the other a NWG/RFC serial number. In addition, she will maintain a current mailing list. NWG/RFC's will continue to be written by anybody, and authors should call Jeanne to get a pair of numbers. An author may choose to mail a copy of his NWG/RFC to all places listed on the mailing list, or may send one copy to Jeanne who will then distribute it. If an author chooses to distribute it himelf, Jeanne would advise him of any correction to the mailing list. Periodically, Jeanne should mail the mailing list out herself as an NWG/RFC. I am enclosing a current mailing list; it has many changes and should be distributed soon." 2a
>
> This arrangement is ready and operative. Jeanne has been distributing numbers already. We are mailing the new NWG mailing list forthwith. 2b
>
> > We are also reproducing multiple sets of back issues of NWG/RFCs, and later this week expect to mail a set for the local collection of each site (custody of their Agent). Updated local-collection listings will be included. 2b1

Item 2: About "separable tasks" etc., and NIC support: 3

> Your Paragraph 4 says, "It is my policy to try to identify separable tasks of network wide relevance and where possible, to persuade somebody else to take responsibility for them. I am talking with Peggy Karp of MITRE about assuming an editorship of the NWG/RFC's and with Mike Sher of Illinois about continuing his accumulation of profiles of the various sites. I think your efforts to make the network more usable through the NIC will be quite valuable, and I know that Peggy and Mike will be quite appreciative of whatever help you can offer them in their tasks." 3a
>
> I am in wholehearted accord with your policy and with these two assignments. It fits exactly the spirit behind my NIC Communique "Memo to Net-Site Managers: Setting up a Network Dialogue System," 1 Oct 70, NIC(4792,). 3b

We have just shaken down our bulk-reproduction techniques with the job of reproducing the reports tendered in response to Mike Sher's request. These, and the associated letters, have been catalogued, and full sets are being mailed (today) to the site Agents (plus updated local-collection catalog listings). 3b1

As we, and our network of Agents, get more familiar with the processes (and with each other), the throughput capacity and response times for such services should improve considerably. 3b2

Note, about professional writers and Network growth. 4

There are a number of areas of special interest within the Net Community: AI, arms, eyes, speech, displays, printers, data-base management, languages, systems, 3-D graphics, picture processing, networks etc.. Because of the advanced and highly specialized nature of the ARPA-Contractors' research domains, I'd say that enlisting from among those directly concerned and familiar with each area the person(s) to instigate queries and surveys, to develop compendia, etc., seems about the only way to proceed. 4a

In this regard, my recent conversation with John LeGates, of EDUCOM's Education Information Network was relevant. I learned that they (EIN) use professional editors to develop the documentation on the programs available at the different university computing centers. It takes about 25 man hours, over something like two months elapsed time, to generate the user-oriented, descriptive documentation for one program. 4a1

It would seem that the ARPA Net would either need to enlist its own research specialists to develop the documentation needed within each sub-commmunity (as defined by interests and activities), or else there would need to be a staff of professional writers. There has never been talk of using professional writers within the ARPA-contractor research community (that I am aware of). 4a2

From all of the discussion of the ARPA Network that I have been in on, my understanding has been that it was to be composed of the ARPA-contract research groups as active participants, with the weather-research people tied on principally to gain access to the ILLIAC IV. From a few

chance remarks lately, I gather that the current concept of the Network may be different from this. 4b

For instance, John LeGates' remark to me last week that Larry is willing to consider tying in with BIN. I heard last Spring about MITRE's joining, recently about RADC's. Your brief exposition in Houston about the difference between service centers and research centers -- a differentiation especially valid for a larger network, now that I think of it. 4b1

If it is planned to expand considerably, to include more general users, and to have service centers as differentiated from research centers, there would be merit in considering using NET-serving professional writers for at least some of the widely-used services. 4b2

I should really learn more about the plans and possibilities for expanding the Network -- a NIC designed for a 15-node research community would have to modify its goals considerably to become the NIC for a big, diversified Network. 4c

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15DEC70 JBN 5618

TRANSMITTAL TO NIC STATION AGENTS
Jeanne B. North, 15 DEC 70

NIC 5618

Enclosed:

1

NIC 5617 DIRECTORY OF NETWORK PARTICIPANTS 15 December 1970 2

Replaces NIC 5609 in NIC 5150 2a

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DCE Notes: BASELINE RECORD AND ARC PLANNING 5625

INTRODUCTION 1

I am concerned with developing our plans through Spring 71, and beyond where meaningful. We are obviously faced with more high-value possibilities than we can cope with. And we are reaching for a new stage of maturity as a "center for research," wherein it is time we began developing more breadth to our activities, such as more scholarship on one hand and more "businesslike procedures" on the other. We are also faced with certain relationships between goals and external-world situations which place competitive needs and possibilites before us. The only way to strike a balance in such a rich domain of interlocking needs, possibilities, resources and constraints is to spend time and energy "designing our future" -- i.e. planning. 1a

I want to launch another pass at developing our Baseline Record. The existing framework seems good enough, and you are all familiar with it. 1b

I would like for Bill English to be the general "pusher" toward getting the Record developed. He should make clear the sub-domain assignments of other pushers. Bill is responsible for COMPLETENESS and CONSISTENCY in the CONTENT of the Record, The detailed content of any specific Baseline Item is generally to be provided by those most closely involved with its design and implementation. And the kind and amount of detail generally expected to appear in the Baseline Record is determined by the needs from the view of other planning Items to have a visible, understandable, and dependable planning-baseline environment. 1b1

It will be Jim Norton's responsibility to see that Baseline-Management TECHNIQUES (e.g., organization, structure, conventions, procedures) are COMPLETE and CONSISTENT -- and are of maximum support for the processes of developing and studying the Record. Special tools for supporting the development and management of the Record are his concern, too -- but due to his current, heavy (gratefully acknowledged) support of NIC development, we must expect his MSR-type participation to be rather light for the next few months. 1b2

My chief involvement will be toward the "architectual form" of the results that this plan aims to produce -- which includes such diverse aspects as: how ARC should be

organized (as a prototype "augmented team"); how L10 will serve as an intellectual tool; how our system's organization will support Network-wide utilization as the "augmented office;" by what measures do we assess alternative possibilities, and by what values do we judge "the best;" what range of tasks should we aim to support in augmenting a system-development team, and what principles should determine the relative allocation of service-system resources among them. 1b3

Note Regarding BASELINE-Record Concepts and Practices: Jim Norton has three memos dealing with relevant concepts, terms, and principles: in (Journal, 4862,), is a brief, general discussion of our "Record-system" ideas; in (Journal, 4863,) he dicusses "Resource Coordintion;" and in (Journal, 4864,) there are miscellaneous rough notes dealing with "roles." I have just entered a short historical sketch -- (Journal,5627,). 1b4

There are two particular time periods that I especially want to become clearer in plans and expectations: 1c

(1) The transitional phase, between now and the time we are fully at home in the PDP-10 -- or if not quite at home, then when the 940 is gone. 1c1

The tasks to be done; when, by whom, and what are the "configuration" features. 1c1a

(2) The months beyond -- shaking down the 10 system and settling down in pursuit of a set (network) of serial-parallel goals. 1c2

I want an early, minimum planning goal of knowing what our next set of goals and assignemnts will be at the time we "move onto" the 10. 1c2a

What I am looking for in this next flury of planning is a clear picture of these two phases. Longer-range matters can well enough be scheduled in a general, descriptive form -- assigning time for subsequent trial designs, evaluations, decisions, etc., 1d

GENERAL COMMENTS ABOUT OUR PLANNING SITUATION 2

About the expected growth of our service load. 2a

Our next stages of bootstrapping will involve a significant increase in ARC's operational dependence upon the computer system. For instance: our corresspondence will be computerized; the XDOC (RINS, JOURNAL, MESSAGE) systems will become more real as a part of our daily lives, and will place increased dependence upon computer service for input, management, and access. 2a1

For ARC's extension into SYDIA-like activities, we must be able to offer (for a price, perhaps) various kinds of service to other groups. This means that not only must we keep things running smoothly, but we must know where our facility resources are being consumed, and be able to extrapolate usage demands and the costs to meet them. 2a2

The NIC services that we are committed to provide will hopefully become a large and growing demand -- "hopefully" because large demand will be the sign that augmentation and bootstrapping are beginning to work out in that (important) community. We have given much concern to the functional features of these services, but the NET-Community's acceptance and use will also be affected by the amount and reliability of our service. 2a3

I have begun encouraging NET people to think of NLS and our augmentation techniques in terms of the "office" (or intellectual workshop), which supplements whatever specialized computer applications exploration that they might be doing. 2a4

I hope to encourage them to try working through the "Office" in developing their software and special user subsystems. Toward this end our software architects are aiming for a special degree of modularity in NLS architecture that will enable another group to develop special user subsystems within the NLS environment, tailored to their specific usage, and designed/implemented by them to suit their particular tastes. 2a4a

They would work via their remote CRT terminals. They could use our extensible-language facility for developing their special "Office tools," and we would make it easy for them to have an "experimental" version of NLS that uses all the standard modules except the one (or perhaps more) that they are replacing with their special versions. 2a4a1

Consider the ILLIAC IV users, for instance. They would be able to work in the NLS Office with their source code and compilers. And, perhaps even more dramatic for them, they could capitalize upon (and help develop) powerful Office facilities to analyze the output results, to study them and integrate them into their notes and publications. For these purposes they assumedly would want to evolve special features -- particularly to accommodate the output, where I could imagine them using all sorts of tabular and graphical portrayals. 2a4b

ARPA has frequently stated that they any unique service which became important to the Network would be fortified to meet the demand. Their statements were made without setting the resource limits. The purpose of the Network experiment includes learning how to share resouces; which to ARPA means that a nice service isn't replicated so everybody can have one, but rather it is fortified centrally so that sharing it is really an example of Netwok utilization. 2a5

Of course there would be limits and delays in this facility fortification. If we are truly successful in enlisting users they will likely push us heavily for what resources we do have (even if for instance we doubled in capacity yearly). Important not only to attracting the users, but in giving confidence that expansion can be justifed and handled well, is that we must demonstrate in the midst of all of this our capability to operate a smooth and reliable service, PLUS our capability for analyzing resource utilization AND our capability for utilizing them effectively. 2a5a

In emphasizing above the increased importance of our operational activity, I do not want to imply that our developmental work stops or becomes subjugated. It is rather to emphasize the balance we need that I am listing these operatioanal considerations. As we venture into a bigger league with the clever functional and implementational features of our systems, we need to face squarely the concomitant requirements of a truly "professionaly designed system," namely that it is efficient to operate and easy to maintain. 2a6

About some of the pressures and conflicts to be resolved in our planning: 2b

Our project finds itself in an unexpected funding pinch between now and next summer: 2b1

Our expenditures for the two-year conract have had a "heavier than linear" spurt in the first year, because of our conversion to the PDP-10. ARPA had agreed to our getting the 10 on the stipulation that it wasn't to cause us to over-run our two-year contract's budget -- and it wont. But later they came back with an independent request that we get by into mid-July 71 within a certain sum -- to help them meet a problem they had in scheduling their fund commitments. 2b1a

It happens that the two requirements together pinch us, and make the 10-transfer cost hurt some of our other goals. (No question in my mind, though, about the 10 transfer being a high-payoff move in the longer term.) For instance, out of some $2.4 million, over the two-year contract, it looked as though (after 10 transfer) we still would have about $125K leeway, to consider using for such items as extra staffing, tertiary-store lease, hard-copy hardware, speech-string I/O hardware, etc. But that "leeway" money won't be available to us until next summer. To get under the wire in July we'll have to do some pinching and trimming. 2b1b

More pressure on us to support NET/NIC activity: 2b2

There is a general tardiness in the ARPA Network's getting going, and in the emergence of an active Network commmunity. This is causing increased tension and pressure upon Larry Roberts, and consequently also upon all of us who have any special involvement in the Network. 2b2a

Without commenting upon how things got into such a state, I'll just say that the opportunity for ARC to be the NIC is extremely important in our "bootstrapping of augmentation systems" bit, and we need to take a serious look at possibilities for increasing our effectiveness there. 2b2b

Consequently, besides accommodating a funding pinch, our planning effort must serve to help us evaluate the possibilities for either/both shifting more resources directly toward aiding NIC activity or/and more

effectively using the resources we do commit for that purpose. 2b2c

I don't yet see enough of the over-all cost-payoff picture to make reasonable decisions -- the information I do have about needs, possibilities, resource requirements, etc. is fractured and incomplete. I very much need help, such as from dialogue with and between ARC staff -- and the WRITTEN-DOWN trial plans, designs, cost estimates, schedules, tradeoff considerations, etc. that make it clear to all involved where we each are and what is the planning environment in which each can make his contribution. 2c

The basic topic of "augmentation" is concerns me, more and more. For years, we have been doing intensive instrumentation development for an augmenation-systems research (bootstrapping) laboratory. We are overdue for turning serious, continuing, systems-oriented attention to the matter of our intellectual activity and the coordinated set of skills, conventions, methods, and tools that can augment it. 2d

The persistently high intensity of our "instrumentation development" seems to be a chronic impediment to exploring and developing the aug-sys framework. At least it has been for me. The list of pressures and constraints above indicates that the scene hasn't changed much. I need help from you people in juggling and balancing all of the factors and finding a good course through them. 2d1

The DSS activity (messages, Journal) is a very significant direction for us to move in this regard. And a workable archiving system is an absolute must. I think, though, that we all agree on these points. What continues to trouble me is the following: For several years the type and amount of service available to us has been adequate (in my estimation) to support considerably more, significant use within our knowledge-worker activity than we have accomplished. There has been missing a general drive, and the necessary attitudes toward, developing a coordinated, "systems approach" to efficient use of these resource, and toward serious, continuing efforts for effective augmentation of our activity. 2d1a

Responsibility for formulating, motivating, and directing such activity is clearly mine. I have felt more and more anxious and frustrated, but not very effective. I don't

communicate well about this for one thing, and I also don't seem to be able to push for the necessary changes when I feel the following double aspects of our intensive instrument-building labors: 2d2

People are already over-burdened, so who's to be pulled off and put onto the difficult and slightly vague assignement of aug-sys framework development? 2d2a

And associated with the heavy instrument-building labor is the sort of personal commitment within each of you which is only natural for bright, responsive people pushing difficult and challenging work, but which somehow I perceive as a barrier against adding a new and difficult level of concern to our whole operations. To push upon you what can only (my perception, remember) be an anxiety-producing distraction, is very difficult for me. 2d2b

This latter (my) problem is in a queer way partly responsible for my poor communications -- I have more trouble than usual in expressing myself when I am unsure of its relevance within the audience's framework, and especially when I view it as potentially distracting and even irritating to them. 2d2b1

I bring all of this up within the context of "Baseline planning" because I recently came upon a startling idea: Why not ask my colleagues (you) for help? I don't mean the "help me do what I tell you what to do" kind, but rather "help me untangle myself, help me communicate what the hell aug-sys framework is, help me find out where you people will be (emotionally speaking) when I have communicated this, help me work out a plan that accomodates and balances the diverse needs, possibilities, resources, constraints, wants, etc." 2d3

So this memo is more than a management directive; it is also a plea for help. I hope to have us launch a continuing high degree of "Baseline Record" development, with participative concern. And I'd like is to see this development go through a sort of two-stage sequence: you help develop a plan that resolves my mixture of views, considerations, commitments, wants, etc. to some practical degree; and then let's start from there and, via dialogue and serious concern, evolve and follow a balanced path among all of our wants and views. 2e

If this proposal seems a bit familiar to you, it's because I reached and expressed the same suggestion about a year and a half ago, in the series of "group" meetings we were having. The approach didn't work then. But now I'd guess it has a much better chance: we are considerably more "seasoned", we have the beginnings of a good framework for portraying our plans (the Baseline Record), and we have a working Journal/Message system through which to conduct a cumulative dialogue. 2e1

There are two companion memos to this one: The "historical sketch mentioned above (Journal,5627,), and a specific list of planning items (Journal, 5626,). These memos aren't as complete as I'd like, but I am interested mainly in getting things launched with a reasonble expression of my position. 2f

The specific "baseline items" in(5626,) are sort of "for consideration." They are the residue of an earlier phase of my recent activity, leading up to this memo -- when I was starting out by collecting my thoughs on our planning situation. They generally represent items of concern to me, but their relative degree of development doesn't represent relative importance. 2f1

Not only would I like for each of you to read this memo, but afterwards please see what you can do over the coming weeks to help ARC develop active, fruitful dialogue toward building our Baseline Record -- and toward building a continuing "mode of life" involving more-general and -constructive dialogue and better planning. 2f2

2f3

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Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

INTRODUCTION 1

Earlier this month I began orienting myself toward a next push on our planning. One of the first steps was to began noting down the things that appeared salient (to me), which resulted in the enclosed rough notes. When I began to get oriented, I decided that I might as well Journalize these notes as a sort of comunication vehicle. It needed an Introduction, and the writing of that began to extract from me quite a bit of material that in the end I felt was much more important than these specific-item notes -- or a least it was of such a different nature that having these notes appended seemed inconsistent. Thus the separate Journalizaing of the erstwhile "Introductions" as (5625,). 1a

GENERAL 2

Report (draft due Feb. 7). 2a

Want to minimize the expenditure of effort whose written product isn't also of high value to our other needs for reference material -- especially for NIC and general Net needs. 2a1

MSR 3

Specify HLP's (Higher-Level Processes) needed, to support ARC/NIC operational procedures 3a

NOTE: "HLP" is a term lately evolved to refer to service processes that are of a generally higher level than those represented by current commands in NLS, TODAS, and EXEC, A characteistic seems to be that the process involves interaction with the user, and the process is often affected by the user's working information. The Collector-Sorter, a Calculator Program, and the Journalizer Processor are examples of HLPs, and so will be our query system. 3a1

HLPs will be used for many things, and as discussed below, we need to work out a general approach for their implementation and use. 3a1a

OPERATIONS 4

I imagine that it will take us a while to develop this Activity into "maturity" -- but there is important need. We

are definitely leaving the stage where we ran an "experimental facility", and entering one in which our experimetation goes on within what we have to consider as a service environment. 4a

I assume that our Operations Activity is concerned with both quantity and quality -- i.e., not just to keep the system running, but also to consider it as a physical resource from which its users should extract maximim utility. 4b

One important need here is to learn how to measure and analyze both system performance and system utilization. 4c

SPECIAL SS PROJECTS: 5

ArchivaL system 5a

Early nail down the specs for this 5a1

Note: I'd like to consider possibility of this being largely implemented as truly a "higher-level process" (an HLP), with the same family of languages as the other HLP's we expect to develop. Therefore I'd like the archival-system specs written with consideration of this -- e.g. the architecture developed with modules and levels that corresspond to different degrees of "liklihood" of their being candidates for programming in tis way. 5a1a

Old, relevant notes: 5a2

(2314-like disk system) 5a2a

Get quotes from several sources. 5a2a1

Leasing, expect montly costs of like: $1750/mo, one-transport sytem 5a2a2

Controller $1200 5a2a2a

Each transport $550 5a2a2b

Disks, ea. $300 5a2a2c

NET (e.g. UCSB) 5a2b

relative performance, costs, etc.? 5a2b1

Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

Mag-tape 5a2c

Will push on to get a PLAN, (WKE to push or this) 5a2d

Who to generate specs on a system? WSD. 5a2d1

Hard Copy 5b

Software Interfaces for improved service to remote terminals of various kinds: 5c

Specify generally (and specifically where appropriate) the kind of terminals and services where we'd see the most cost-payoff return, and develop design proposals for our providing this service. 5c1

We are already committed to the IMLAC as a candidate. 5c1a

Output Processor 5d

Speech-string NLS 5e

Increased potential relevance in the ARPA Net because of the forthcoming Speech Project(s). 5e1

SPECIAL SUBSYSTEMS (As Described from User Features) 6

Special HLPs: 6a

Instructional aids (Computer-Aided Instruction) in specific areas 6a1

Query: over Catalogs, NIC, Journal, Messages, notes, etc. 6a2

Languages and techniques to help HLP Writing, Debugging 6b

Graphic Manipulation 6c

Tabular Representation, and Manipulation 6d

Interactive, Calculator Graphics 6e

Publication System 6f

Table-of-Contents generation 6f1

Index Generation 6f2

Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

Terminals 9b4a

COM 9b4b

Microfilm 9b4c

Development of collections for special-interest activities 9c

Conventions, special tools, for linking notes into catalogs for "conjoint retrieval" 9d

DSS "SPECIALS" (WHERE DIFFERENT FROM NIC NEEDS) 10

HLP DEVELOPMENT PLANS 11

I want to review the matter of comparative payoff in HLP development, relative to re-thinking the progamming languaes for HLP. 11a

Some HLP's will be very important for us to have during the next few months -- pushing ahead with them seems worthwhile, using our present approach for their programming. We should derive useful orientation about requirments and possibilities for better HLP languages. 11a1

Candidate HLP developments, for the near-future implementation. 11b

Catalog management, 11b1

entry processing into NIC/ARC Journal, 11b2

General approach I'm currently looking for in this department: 11c

We should produce soon two types of formulation: 11c1

Requirements, useful possibilities, and relative values thereto, for HLP's within the ARC/NIC environment -- the type of material from which we can develop specific user-feature plans over the coming year. 11c1a

A language-development proposal specifically aimed at supportng HLP writing 11c1b

-- and then balance our plans for developing languages and HLPs. 11c2

Miscellaneous Baseline Items: Scratch Notes cf(5625,) 5626

Notes on current (12 Nov) activity: 11d

New NLS (experimental) ready in a day or so. 11d1

Manual -- WLB been developing (bass, hlpdoc,) 11d2

General plan -- e.g. what HLPs to develop, trial specs, etc. (english, plhlp,) 11d3

HLP programs written 11d4

Walter -- Old-catalog-format conversion aids 11d4a

Fred -- small query system 11d4b

Bruce -- Formatter, for citations. 11d4c

SPECIAL SOFTWARE ACTIVITIES: 12

L10 development: 12a

String Handling 12a1

HLP Programming Language(s) 12a2

-- -- 12a3

Multiple-sequencing (for users) 12a4

Incremenal Compilation 12a5

Multi-module 12a6

System monitoring, and usage/performance analyses 12b

SPECIAL, SORT OF "NEW" ACTIVITIES 13

USER FEATURES (The Activity) 13a

ARC's methods for recording NP, Plans, etc., wih respect to the users, at their different levels of involvement and proficiency. 13a1

Development of projected "Whole-system" envirnment of our users. E.g.: 13a2

The "office" picture -- developed with attention to the

different special "working-context domains" which will be part of the computer-aid environment for systems-development teams. For instance, planning, project review and evaluation, task control, configuration management, resource management, design development at different special levels and technical domains, system analysis (in each level and domain), design documentation, checkout, debugging, maintenance, corrsspondence, publication, external-world "intelligence" activity, etc. 13a2a

General domains, such as study, formulation, argumentation, analysis, special portrayal development, etc., will be the foundation of all special work. A strong body of concepts, conventions, terms, procedures, etc. must emerge and keep growing. 13a2b

Special plans for user reference support, testing, and training. 13a3

HANDBOOK 13b

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29DEC70 DCE 5630

NETWORK MEMO

from: Doug Engelbart (SRI) 29 Dec 1970 1

via: NIC 2

to: ALL SITE LIAISONS (Directory: NIC 5617) 3

We (NIC staff) are distributing two memos originating from SDC: NIC Items 5628 and 5629. They represent a type of communique that we want to encourage and give supportive service to. Will you please see to it that appropriate responses are produced from your site. 4

In the formulation for our "Network Dialogue System," (See NIC 4792), the Technical Liaison man at each site was to have a dual function: 1) to support the people at his site with technical information about the Network and NIC, and 2) to serve Network people from outside his site by fielding technical questions aimed at his site. "Fielding" doesn't necessarily mean "answering" the questions, but rather seeing to it that the appropriate person at his site agrees to provide an answer (and supporting the person with information about the Network if he needs it). 5

So, for each of the two SDC memos, please do the following: 6

1) Communicate to the sender acknowledgement and disposition of his memo -- perhaps an answer, or the name of the person who has agreed to answer. 6a

2) Communicate by phone if you wish (as suggested in the memos); but I would encourage an alternate mode -- an informally written message transmitted by your Agent, via NIC, as a sort of "registered message." Using this communication mode helps accumulate a recorded dialogue. These dialogue items (separate communiques, memos, messages, ...) will be retrievable from NIC, and for a while many of them will be duplicated and kept on file with your local Agent. Among other values derived from this form of recorded intercommunication, we hope that people at different sites browsing through such interchanges will become motivated to join in on the dialogue by entering contributions -- questions, comments, added information -- very much as though there were a continuous multi-party dialogue going on where everyone is invited to participate when and where he wishes. 6b

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Letter to Martha Pattillo, Center for Applied Linguistics

Martha Pattillo, Coordinator
File Management System Inventory
Center for Applied Linguistics
1717 Massachusetts Avenue, N.W.,
Washington, D.C. 20036 1

Dear Miss Pattillo: 2

This concerns your letter of 17 December, ARC(5635,), Your NSF inventory project interests me on several counts, with respect to the developments and plans of the Augmentation Research Center (ARC): 3

1) We are using/developing an information system whose description can be supplied for your inventory. 3a

Under our "bootstrapping" mode of doing augmentation-systems research, we are continuously developing and improving the system's features toward increased service value to our own group (systems developers) -- wherein file and data management are receiving ever more attention. 3a1

As a participating "node" in ARPA's experimental computer network, our research center is serving as the Network Information Center (NIC). In this capacity we are well along in developing means for remote query and access to bibliographic catalogs and full-text documentation by Network-linked people across the country. 3a2

The Network is only just becoming functional, and until the participants can "reach us" from computer terminals, we are providing a hard-copy service, through the mails, that is automated by our Center's computer aids. 3a3

2) Under a contract with the Office of Naval Research, we are currently extending the system with special tools and techniques toward developing what we call a Research Intelligence System (RINS) -- designed to support the collection, management, analysis and publication of survey information needed by R&D groups. 3b

We are planning to use RINS to help develop an "intelligence" data base relevant to computer-systems

development, in which a base on information systems is a key part of the plan. 3b1

We are hoping to see the development of parts of this intelligence base become a cooperative venture, where for instance we might supply remote computer-support service (RINS) to a group who are developing a special-interest intelligence base. They would get computer aids for composing, editing, cataloging, indexing, and publishing their data base, plus querying and access aids if they are needed; and also they would have access to the intelligence information similarly developed by prior (or concurrent) groups. We would expect then that this new data-base component would similarly be available for other groups. 3b2

I am mailing some of our recent reports to provide you with the most relevant of our technical publications. 4

It occurs to me that perhaps we could do some mutually useful collaborating. In this regard, I would like to learn more about your Center's activities and plans -- do you have any written material that you could send to describe them to me? 4a

I will be in Washington during the week of January 25, and will try to give you a phone call to get acquainted. (I am a member of a Panel on "Information Systems," under the Computer Science and Engineering Board of the National Academy of Sciences. We are having a long meeting, so I don't know yet if I will have any spare time. But note that this Panel participation provides another area of my activity that relates to what you are working on.) 5

Sincerely,

Douglas C. Engelbart, Manager
Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025 6

cc: D. R. Brown 7

encl: ARC biblio sheet; RADC '70; NASA '70. 8

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Letter to Martha Pattillo, Center for Applied Linguistics";
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1970 Project Activity: Augmentation Research Center (ARC)

D. C. Engelbart Stanford Research Institute

New Computer. Our XDS 940 has been replaced by a PDP-10 with a core memory that has twice the speed and three times the capacity (128K x 36 bits x 1 μs.), plus time-sharing hardware and software (TENEX) considerably more efficient than the 940. The PDP-10 will be a significantly more powerful support and will be readily expandable if more capacity is needed (the 940 was not expandable).

Improved System Languages and Architecture. The conversion of NLS to the PDP-10 occasioned an up-grading of both the programming languages we developed and of the software architecture for NLS. As a tool for systems programming, L10 (as we call this next-generation language) is significantly more powerful than the special-compiler language (MOL) we developed for the 940. It is also much less machine dependent -- the next time our large, complex systems are transferred to a new machine, we will be able to do all the reprogramming with a few man-months effort. The organization of NLS has been rearranged to derive a number of benefits. A very important one sets us up so that we can gracefully develop service for a wide variety of remote CRT terminals, through the ARPA Network, and with the full power of NLS. The combination of improved language and architecture will allow easy and rapid (explosive) extension of user features.

Connection to the ARPA Network. We have had our hardware connection since last summer. In our heaviest mode of use, we developed programs in Utah's PDP-10, and, as part of the conversion process to our new computer, we debugged PDP-10 versions of our NLS programs by shipping binary files to Utah's 10 via the Network (a matter of seconds). Our programmers operated Utah's debugging system from our own display consoles, with our 940 linking the console through the Network to the other computer, so that the programmer interacted just as though he were at Utah. (Our next TENEX NCP should be installed and operating by the end of February.)

Network Information Center (NIC). We have begun operating by telephone and the U.S. Mail. We established a "network" of R & C (Reference and Communication) Stations, one per Network site, holding hard copy reference material that we supply (by mail), and served locally by a Reference and Communication Agent assigned by the site. We set up "Enterprise" telephone circuits, covering the geographical areas of all sites, connected to two incoming private lines at ARC that are attended by an answering service. The system provides toll-free around-the-clock communication from all sites. A selected sub-collection of our master collection, including some 120 of our most relevant documents, has been replicated and a set installed at each Reference and Communication Station, together with a computer-generated hard-copy shelf list and author-sorted index. We support the interchange of memos and messages. We catalog them for future retrieval and, for the time being, distribute copies of each site's collection to stimulate dialogue.

On-line services will be available beginning this spring, including automatic message sending and cataloging, interactive querying, full-text retrieval of computer-held information, private-collection management, documentation-development aids, publication support, etc.

Remote Display Terminals. To expedite remote Network participants' use of NLS, we acquired an IMLAC self-contained processor-display system. For a little less than $20K total cost such a unit can be equipped with 8K of core, and outfitted with ARC's standard mouse and one-hand keyset to supplement its keyboard. We have installed a unit at a site 100 miles from our laboratory and connected it over a 2000-baud phone line. A top systems programmer works (for us) full time with the modified IMLAC -- currently using it only as a very fast typewriter, but steadily deriving advantage from its local storage and processor. We expect to achieve full NLS function within several months. Any Network site installing a similar IMLAC terminal could have full NLS (with fast response) very simply.

Dialogue Support System (DSS). This system of tools, files, conventions, etc., provides a means for accumulating, retrieving, and studying the collaborative communiques generated within ARC. Internal messages and memos, outgoing correspondence, official plans and designs, policies, reference guides, etc., as produced by our computer aids, are stored as computer files in retrievable form. Each entry is given a serial accession number and is cataloged as an entry in our one master catalog. Extensive techniques are being developed to facilitate search and retrieval (e.g., interactive set manipulation). The DSS has been developing steadily over the past eight months and is intended to be the means for everyday collaborative dialogue among ARC's system-development team. From DSS will come a facility for "backward" detection and pursuit of reference links. In scanning a catalog entry (for a file, a book, etc.), or an on-line file, the computer will be able to detect the presence elsewhere in the files of a link (reference citation) to that item, and it will know who generated the link and when. This back-linking facility will greatly enhance the power of our computer aids in studying and analyzing our on-line documentation and bibliographic files. (NOTE: When these DSS techniques become well checked out within our own working environment, they will be made available to support dialogue among other Network participants.)

27JAN71 DCE 5698

NETWORK MEMO

from: D. C. Engelbart (ARC) 1

via: NIC 2

to: Abe Landsberg (SDC) 3

c: All Station Agents (Directory: NIC 5617) 3a

re: Your phone call to NIC at 11:30, 19 January 1971, concerning ORBIT and NIC. 4

I think ORBIT is an impressive system. I'm not sure what you have in mind about ORBIT and "coordinating with TODAS so we can exchange bibliographic references ..." (as I got the message) -- but I would be interested in learning more about your interest. 5

Last Spring we scouted out the Network sites to see if any data-base management systems would be accessible through the Network. I was particularly interested in Tdms, Cdms, and Orbit. Clear Weissman (SDC) told us that none of these systems would "naturally" be on the Network, but for due consideration they could be made so. 6

We were exploring the possibility of using such a system for the large-bulk management of the bibliographic base for NIC as it might grow -- using our type of fast (and expensive) processing for smaller sets of data as extracted for special study by the big-base system. This is part of our specific interest in "distributed-data-base management;" see NIC memo (5699,) my reply to Arie Shoshani's memo (5629,). 7

We didn't find a ready-made Network-available big-base system, and we did resolve a reasonable approach here for bases with tens-of-thousands of items (which suffices for NIC'S needs for a while). But we have remained interested in the possible emergence of a good system, and in how we might make use of such a resource for managing Network-relevant information. 8

ORBIT would be a marvelous possibility in that respect -- but what is its status with respect to being available through the Network? I'd like to hear. 9

Otherwise, interchanging relevant reference information, or engaging in any other collaborative or co-operative activity, would be interesting to consider. What might you have in mind? 10

Incidentally, I met Bob Katter (SDC) last week, and developed a

hope then that there would be an opportunity sometime to interact more with him. Would he be associated with whatever you have in mind here? 11

NIC 5139, an item in your Station's NIC Collection (a report on our project from last April) has a good deal of technical information about our system. Refer to Appendix A for a detailed summary of the principal user features -- especially Section II (p.148) about the TODAS interface. The rest of the report contains a great deal of technical information about our systems, which may be of help. 12

Let me hear about further information needs. And if you can, will you please forward some up-to-date ORBIT reference material? 13

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27JAN71 DCE 5699

NETWORK MEMO

From: D. C. Engelbart (NIC) 1

Via: NIC 2

To: Arie Shoshani (SDC) 3

Subject: Response to NIC (5629,) 4

In reviewing progress of NIC dialogue, I noticed (with a bit of chagrin) that we had not given our direct response to your query. 5

The Augmentation Research Center is much very interested in distributed data bases. Our interest is entirely from our NIC point of view. 6

We have looked at the possibilities of using a data-base management system at another site to manage the large-bulk bibliographic base that we expect NIC to have within a year or so. We recently received a telephone query from Abe Landsberg (SDC), about SDC's ORBIT system, asking us if we might be interested in some sort of cooperative interchange or collaboration. See NIC (5698,) for my detailed answer. 7

Here, we would use another's DBMS for some of the management and query operations over a bulky data base that we maintain. This would be to supplement our own query and manipulation processes, which evolved in an environment of fast and ultra-flexible manipulation (for study, integration into documentation, etc.) of smaller data bases. We aren't yet sure of where the break-even size would be for us if we did divide the data-management tasks between ours and another's systems -- we are still in the investigation stage. 7a

Where we store the data, whose bibliographic development and management we take care of, is another question. 8

We are anticipating the Trillion-Bit Laser Store that ARPA is installing at the ILLIAC-IV site -- assuming that the archival storage of all the NIC-catalogued computer files could be handled there. 8a

Pending the store's availability, we have been exploring various possibilities for an interim archive-storage system; for instance, we have considered using the services of the operators and disc-files at the Computation Center at UCSB (via the Network). Dave Harris and his associates there have been very cooperative in encouraging this. 8b

Our main problem in both of these cases (for engaging in distributed data-base studies) has been our getting tremendously immersed in transferring our systems onto our new PDP-10. By March we should be in a better position to pursue these matters again. We would welcome more dialogue on the matter. 9

Bill Duvall is working on the design of our file-management system, for our new PDP-10 TENEX environment. You can check directly with him for further details of our plans and developments. (415) 326-6200, ext 3268. 10

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27JAN71 DCE 5700

NETWORK MEMO

From: D. C. Engelbart (ARC) 1

Via: NIC 2

To: R. E. Long (SDC) 3

c: All Station Agents (Directory: NIC 5617) 4

Re: Response to NIC (5628,) 5

I am sorry that we took so long to answer your memo. We got so involved in figuring out how to support a dialogue system that we almost forgot to participate in it. 6

We aren't LISP users. It is quite possible that we will want to integrate some LISP processes as tools available to our on-line users. This isn't too likely this year. If we do, our PDP-10 puts the whole BBN-TENEX LISP system at our disposal. 7

We plan to give first-priority support to heavy use of NIC and of our NLS (for general use) -- to users within our own group and scattered around the Network -- so we expect to be very cautious about the way we would let LISP users loose within our system. So, even though we will have a very nice LISP system, our resources are committed to giving first priority to other types of use, and we would prefer not to promote use of our 10's LISP system until we learn more about the 10's carrying capacity. 8

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27JAN71 DCE 5701

NETWORK MEMO

From: D. C. Engelbart (ARC) 1

Via: NIC 2

To Len Chaitin (SRAI) 3

c: All Station Agents (Directory: NIC 5617) 3a

Re: Response to NIC (5637,) 4

Bill Duvall is now designing the file-management system for our TENEX. We have a 96-megabyte Bryant Disk which we plan to use as working secondary file storage. We need some form of tertiary storage and a file-management system that automatically moves files between secondary and tertiary storage according to demand and access usage. What we will actually use for tertiary storage will undoubtedly change. We might begin with mag tapes and from there go either to moveable-head disk transports tied to our computer, or perhaps to a 2314 (or even mag tape) storage at UCSB Computer Center -- via the Network, see NIC (5699,) regarding our interest in distributed data bases. 5

It would seem worthwhile for you and Bill Duvall to communicate directly. He lives and works (on line) 100 miles away, but you can easily reach him by phone through an off-site SRI extension (3268), and he is here at least one day a week. 6

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27JAN71 DOE 5702

NETWORK MEMO

From: D. C. Engelbart (ARC) 1

Via: NIC 2

To: Ari Ollikainen (UCLA) 3

c: All Station Agents (Directory: NIC 5617) 3a

Re: Response to phone message to NIC from Anita Coley 4

This is in response to a phone message to NIC from Anita Coley, your R&C Agent. She said that you had heard about a (possible) meeting to be held at SRI for Liaison and Station Agents, and that you would like to know more about it. 5

You doubtlessly remember this topic coming up at the meeting Steve Crocker organized in Houston at FJCC time. I am all for having an Agent/Liaison get-together here -- I would very much like to show all of you what we are doing here, how our systems work, how they will work for you when the on-lineness becomes real, etc, and I think that such a meeting would greatly boost the sort of Network-wide interest and activity I want to see. 6

The most appropriate time for us to organize and host such a meeting would be after our PDP-10 transfer is (reasonably) done. The first opportunity would likely be in mid-March. I plan to discuss the matter with Larry Roberts, Steve Crocker, and the Principal Investigators at the Feb 9-11 ARPA Contractors meeting in San Diego. I was waiting to announce anything about it until after that meeting. As soon as I know anything more definite, I will inform you (and the scattered clan of Agent-Liaison counterparts to Anita and you). 7

In the meantime, any further questions, comments, etc. from you about NIC, dialogue, Reference and Communication Stations, roles of Agent and Liaison, or etc. are welcomed and encouraged. 8

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NETWORK MEMO

from: D. C. Engelbart (ARC) 1

via: NIC 2

to: ARPA/IPT Principal Investigators, see (5454,). 3

c: All Station Agents (Directory: NIC 5617) 3a

re: ARPA Contractors Meeting Short Summary Reports 4

TOPIC: Larry Roberts recently (14 Dec 70 letter) invited you to the ARPA Contractors Meeting in San Diego, Feb 9 through 11. In that letter, he asked each of us to provide 40 copies of a short summary report of our group's activities, for distribution at the meeting. 5

ACTION FOR YOU: This memo is to ask you to see that a certain 4-digit number is put on your summary paper when it is so "published", preferably appearing on the upper right corner of each page in this form: "NIC nnnn". 6

Have your secretary take your four-digit number from the attached list, distributed as NIC (5454,). 6a

And, if reasonably convenient, have her send 25 copies to NIC for distribution to the NET-site R&C station collections. (R&C = Reference and Communication.) This will save us making duplicates from the copy I otherwise will bring back from the meeting. 6b

REASON FOR ASKING THIS: I want to make these summaries available throughout the Network community -- such a process is the proper concern of the Network Information Center (NIC). These documents will be valuable reference material. 7

Your four-digits are the accession number that will be used for bibliographic control of your summary. Your attaching the numbers initially will accelerate NIC's distribution process, and will help avoid confusion in subsequent referencing and querying. 7a

Whether or not you manage to attach the number, we will enter your summary into the NIC collection, under this pre-assigned number, and catalog it so as to make it locatable by scanning our hard-copy indices or by on-line query. 7b

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D. C. Engelbart, 24 Jan 71 INFOSYS 5706

Interim Position-Paper

INTRODUCTION 1

Consider the technology that our Panel studies, for its possibilities and needs in remedying the "library problem" -- while we are examining possibilitis, trends, etc., we should keep the following in mind: 1a

During the period in which computer technology is being extensively integrated into the Library System, there will be concurrent activity by other segments of our society, industrously integrating computer sytems into their workaday world -- toward helping in such "intellectual, knowledge-oriented" activities as their studying, formulating, communicating, teaching, deliberating, negotiating, planning, managing, etc. 1a1

On a large scale this will have an overwhelming effect on the quantity of significant, recorded communication that will need to be stored and rendered retrievable for subsequent access -- i.e. the library problem is going to be made very much bigger by the very technology that provides hope for dealing with it. 1a2

NOTE: My personal professional activity is very strongly oriented toward improving the information-management capability for working teams. I find that the increase in recorded dialogue that results is quite marked. Moreover, to increase the coupling between the intellectual efforts of different groups, it is important to make their workaday information available to each other -- i.e. to have library-like service over the memos, trial designs and plans, analyses, studies, etc. that are a constant product of an active group. 1a3

This is the only way (in my opinion) that we can effectively harness the intellectual and knowledge resources of humans within large-scale activities -- i.e. within the social institutions wherein our most complex, urgent problems must be solved. 1a3a

Thus, technology will likely open the floodgates to the production of a vastly greater volume and diversity of recorded material. 1a4

The size of currently published information packets is influenced by evolution within a non-automated culture. Our

emergent high technology could easily make practical the independent publication of paragraph-sized packets as relevant and valuable contributions to a recorded dialogue. (This, in fact, is seen to be very probable from my own experimentation.) 1b

The recorded dialogue system for a social institution is certainly a critical component of what to an organism would provide the functions of its central nervous sytem. It is absolutely essential to the continued evolution of society toward providing an improved life environment for its individual human beings that the production, management, retrieval and access of recorded dialogue be as effective as possible. 1c

Viewed as but a part of society's recorded-dialogue system, today's libraries may possible show up as obsolete components -- the r-d system of tomorrow may well distribute the various functions of a library in such a way that ordering, cataloguing, bibliographic security, and physical accessing (and studying) are done in widely separated places and/or with distributed services. 1d

Are we looking for a way to buttress the libraries with new technology, or are we looking for the best way to improve society's recorded-dialogue system? 1e

Certainly, if we are looking for the best way to improve society's recorded-dialogue system, we must make the most of the resources of our current library systems, and should undoubtedly plan for evolution from the current situation in a harmonious sort of way that among other things doesn't needlessly abandon valuable assets. 1f

Miscellaneous 1g

Would "library automation" be an appropriate term for Panel study? 1g1

What aspects of the problem could INFOSYS concentrate upon so as to maximize its value to CLR, NAS/CSEB, the Library Community, and the Computer Industry? 1g2

From what Jack Kettler said Thursday: A "Bright" look at the technology side of things. 1g2a

Can we learn enough about the library business to make significant statements on the businss economics of such areas as indexing, cataloguing, circulation, etc.? 1g3

Following are a number of personal hypotheses that represent my current "position" relative to the study of the INFOSYS Panel: 1h

TIMELY SOLUTION REQUIRES SIMPLE PLAN, BUT BOLD AND MASSIVE 2

It really does seem to me that there is a basic consideration evident here, in the Library Problem: 2a

There is a very complex interlocking among the economic, political, traditional, attitudinal etc. factors of the Problem. 2a1

Any significantly effective solution (The Solution) is obviously going to have to make large and pervasive changes, which will cause many, quite traumatic adjustments among individuals and institutions, 2a2

To make these many changes an adjustments within a complicated Solution-framework would multiply horribly the difficulty of implementing the Solution. 2a3

I therefore feel that The Solution has to have a framework that is simple and direct in its essential details. The complex changes and adjustments should follow from the many sectors and groups adapting relatively autonomously to unambiguous, simple, straightforward directives and guiding actions -- as contrasted with a plan that involves a lot of centralized (or inter-faction) planning, coordinating, monitoring and enforcing. 2a4

The "Bold and Massive" aspects would be necessary, I feel, from both a psychological and a technical considerations. 2b

Psychological, because there needs to be something very clear and compelling in the air about the changes to come to get all parties who really have to participate in the changes and adjustments to get about the long and detailed process of doing their part. 2b1

Technical, in that the objective details of developing new organizational structure, roles, equipment, services, etc.

really needs to be thought through and approached in a coordinated, total sense -- not a patching up of old ways. 2b2

It is quite obvious to me that the changes have to be evolutionary -- so I am not intending the "Bold and Massive" to mean "discontinous, revolutionary". I mean for "Bold an Massive" to describe the goals and energies to be associated with the EVOLUTION of the Library System. 2c

Achiving a high evolutionary rate, without discontinuities or traumatic shock, can be significantly abetted by building these attributes into The Solution Plan: Simple; Bold; Massive. 2d

LIBRARY DIRECTORS AREN'T THE ONES TO BEAR THE SOLUTION-BURDEN 3

Where is the "industry" that can provide "architectural" and "builder" services? 3a

Whose responsibility is to develop library automation? 3b

Libraries on the whole seem to be in a helpless position as compared to another kind of industrial plant that might be faced with similar conflicting pressures and demands: 3c

Library managers are appointees whose operating budget is an appropriation, within an institution (university, county, corporation). 3c1

They are not trained to innovate new products, build new markets, etc. 3c2

They have no Board of Directors and stockholders to decide on a long-term plan and commit resources. 3c3

Are we expecting these "plant managers" to renovate their industry, where it wouldn't at all be the plant managers who would carry this burden in other industries? 3d

IS REORGANIZING THE LIBRARY INDUSTRY A VALID POSSIBILITY? 4

The commodity of information has a strange way of being produced, marketed, maintained, etc. Any other industry operating this way would be unable also to cope with large-scale problems. For example, the steel industry wouldn't have efficient furnaces, the transportation industry

wouldn't have jets (or even airplanes, what with the fantastic revolution they involved). 4a

Is it at all possible that this information industry could be re-organized in such a way as to generate its entrepreneurs, capital, etc. within the usual "market" system? 4b

For instance, how about charging full cost for library service, as cost-accounted in a business-like way. Then, for instance, the budgeting in a university would have to put into the hands of its academic deprtments funds that otherwise would be apportioned directly to the library, and the library would be charging for service costs and perhaps seeking profits. 4b1

I'm sure that the term "information utility industry" must be brought forth regularly for analogy in discussions of this sort. But to risk old-hatting a concept in finishing my line of thinking here, I'd like to point ot that an electric-power utility, for its larger customers, must impose a monthly charge that represents the costs of guaranteeing that the agreed-upon quantity of power will be available upon demand. The utility company must establish an expensive, general system of energy converters, generators, transmission lines, and distribution systems, and for each big customer he must install a specific system of lines, controls, tranformers, and such coming into his plant that is adequate to meet his demands. The peak demand that a customer may make (i.e. how many megawatts maximum he can draw during a given time of the week/day) is very carefully negotiated and monitored because of its economic significance in the business of supplying power. 4b2

Similarly, an informaion utility would have to charge big customers for "negotiated demand availability," as well as for specific services. For example, the history department would receive a hefty charge for maintaining a large, seldom-used collection in a condition of ready demand. 4b3

I appreciate such things as the fact that this bill may exceed the current budget of a history department, and that it might be harder for budget allocators to give the money to that department than to the library; but a move such as this would put the decisions about financing library costs where they are more relevantly connected into cost/value tradeoffs, and would have the

appropriate effect of distributing the budget-defense burden more where it ought be. 4b3a

The Library would get a small budget, and the History Department would have to fight for its "library" money (perhaps make deals with other departments for sharing carring costs of some collectons, etc.) 4b3b

If, for instance, there actually must be (for all I know) $50,000 per year funneled into the library for each serious scholar, it would seem to me important to be open about it and not hide this fact from scholars and their backers -- show on the books what it does cost, pass the resources through the scholar's department, bill the department for library services and for on-demand availability, etc. 4b3b1

I know that this line of thought drifts from the appropriate INFOSYS area. I guess that I am showing the results of recent struggles of my own to formulate the working relationships between elements of a large team so as to distribute responsibilites, freedom of choice, opportunity to adapt, etc. over the group, toward maximizing its net flexibility of developing and pursuing human goals. 4b4

I should point out that one of the significant things that concurrently will be emerging from the harnessing of computer technology, will be new ways in which an organization can be structured into functional groups, and new speed and flexiblity in its inter-group negotiation and transactional administraton. This type of development really could make a significant difference in the ways in which an automatied information utility could operate. 4b4a

COMPUTER NETWORKS, UTILITIES, AND RESOURCE SHARING ARE THE SOLUTION FOR SERVICING LIBRARY-SYSTEM AUTOMATION 5

Like any of the other businesses, libraries will find it profitable to autmate purchasing, inventory control, staff task monitoring, etc. -- I really don't think that INFOSYS should worry overmuch about automation ofthese areas; it will come about very naturally, andbe affected mainly by two things: 5a

Bringing the costs down, and 5a1

Getting the systems industry to be more mature in its ability design, install, and operate effective service systems. (See discussion of this factor below.) 5a2

Bringing costs down will in turn come from two things: 5b

A large, active consumer market (for computer systems of this kind), so that there is competitive pressure to improve product designs, manufacturing efficiencies, marketing and maintenance services, etc. (This also depends upon a considerably matured computer-systems industry, which necessarily has to grow together with the its market.) 5b1

Efficient use of capital investments -- as put into software, hardware, procedures development, cataloguing, microfilming, computer-form transcription, computer typesetting etc. 5b2

In this latter category, I can't see any other factor as important as "computer networking," with its wider-market participation (sharing) of hardware, software and data-base resources. 5c

For instance, University Computing Inc. were very emphatic about the improved economy of maintaining and operating, large, multi-computer installations, as oppossed to the same total computing/storing power distributed over a number of sites. 5c1

Other segments of our society (other markets) will want very similar services, and libraries will be able to share the larger-market benefits in buyin their services from computer utilities. 5d

Other needs, such as: logistics, inventory, intelligence, personnel, purchasing, publishing, merchandising, 5d1

And really, libraries shouldn't be in the technology-management and operating business -- any more than they should be in the publishing business, or in the business of doing original-scholarship research and authorship to produce the journals they handle, or in generating their own electricity, or etc. 5d2

A larger, more flexible, and more active marketplace can thus be established, in terms of range of equipment and services available for libraries to select from (and change between), and in terms of the number and diversity of library customers and needs "reachable" by service vendors dealing with transmission, storage, and processing. This makes the difference between impractical possibility and practical feasibility in contemplating a significant degree of automation for libraries. 5e

In flexibility, range of services and customers, costs, competitive evolution, etc. 5e1

INTERACTIVE COMPUTER AIDS IMPORTANT, BUT ONLY IN CERTAIN AREAS OF LIBRARY AUTOMATION, AND MUCH PUSH ON THEM ANYWAY FOR OTHER USES 6

I have specialized and pioneered as much as anybody I know of toward learning how to harness interactive computer aids into knowledge-worker activities. 6a

I am quite convinced that interactive computer service will produce extremely high payoff in supporting the minute-by-minute intellectual endeavors of trained people. The modes of use will be not too dissimilar from the ways a private automobile supports the minute-by-minute transportation activitis of (trained) people. 6b

BUT: 6c

one doesn't use his private automobile for all of the transportation sevices. and 6c1

interactive computer services won't be used for all of the information manipulation services, either. 6c2

Ships, trains, trucks, airplanes, buses, etc. are an extremely important part of the transportation industry, and 6d

Remote-batch processes, running at different levels of priority according to sensible scheduling algorithms (which are delicately adapted to many factors in the physical service system and in the users' working and information context), will be absolutely essential in the computer systems. 6e

I must add, though, that I also expect that most of the knowledge workers in the libary system will probably end up

working at interactive consoles, as a key prt of making the Library System really effective. 6f

VALUE TO BREAK-THROUGH TECHNOLOGY, BUT VAST IMPROVEMENT POSSIBLE WITHOUT IT 7

I am sure that such as massive storage devices, digital communication systems, microform technology, as examples, will improve mightily in the next decade, and that The Solution can (and must) depend upon this impovement. 7a

But I feel that the expectable improvements will be adequate -- i.e. that we don't have to depend upon hoped-for breakthroughs. 7b

And it is also apparent to me that establishing and launching the critical framework of The Solution needn't wait upon these. 7c

COMPUTER-SYSTEMS INDUSTRY NEEDS SIGNIFICANT MATURATION 8

I feel that, even more important than the "expectable technological improvements" mentioned above, as things that technology must do for The Solution, is that there evolves a more mature "computer-systems industry." 8a

Consider the industry that exists to provide new buildings: 8b

There are skilled, experienced firms of architects who can work with a client to develop an overall plan to suit his needs -- where specal attention and interactive dialogue is given to the the "user features," i.e. to the features that the building's users are aware of. 8b1

And there are many competitive firms of building contractors and sub-contractors to build what the architect planned. And there are many conventions for who monitors what, inspects what, etc., and for how the processes of bidding, negotiating and accepting are done. 8b2

I don't consider the computer-systems industry tobe in very good shape as far as providing really good architects and builders. 8c

Most architects (of computer sytems) want the buildng job,

too, or are even actually the sellers of the concrete and steel as well. 8c1

And their really isn't within the computer-systems industry a discipline that compares with user-oriented building architecture -- computer-systems "architects" are more like the structural engineers who really know how to make it strong or reliable, but aren't really trained to shape things senisitivvely to the users' subjective and objctive functional needs (much less to their aesthetics), or even very well to accommodate the cost/payoff neet/value framework of the users. 8c2

Also, the "builders" in the computer-systems industry aren't very good at meeting schedules or budgets, and their products aren't easily enough maintained, modified, or transferred onto other sites. 8d

Their sytems admittedly are often the most complex that man has designed, and apparently there isn't yet a (known) method for materially improving this situation. But if these complex systems are to serve in support of complex human operations, then there is an absolute need for the quality of both the production process and of the product to improve significantly. 8d1

For instance, I feel that there must appear cleaner conceptualization for system functions and system levels; and both pogramming and problem-descriptive languages must improve. Also, the processes of design and of management must be improved significantly -- as must methodology, tools (including computer aids, of course), conventions, concepts, team-collaboration modes, documentation, methods of bootstrapping systems onto new hardware, new operating systems, or new compiler systems, etc. 8e

SIGNIFICANTLY NEW WAY NEEDED TO DO COMPUTER-SYSTEMS EXPERIMENTATION 9

Hypothesizing that a new, quite different R&D system could be the best answer to society's needs (payoff/cost in long-range framework), what considerations seem especially relevant in trying to sense the probable form and nature of that system? 9a

Big Library-system R & D Center (ss proposed by Overhage)? 9a1

I actually think that the new way of doing experimntation must emerge as part of the Simple, Bold and Massive Plan. An evolutionay process should be built into The Solution Plan, and the R&D, experimental devlopments, etc. must be arranged for as part of ths evolution. 9b

MICROFORM FOR GENERAL WORKING HARD COPY 10

Much more information to be available to a much larger clientele, is a direct trend; if the automated dialogue obtains, there will be an added increase in quantity and in activity; 10a

And we are shifting to a knowledge-worker society -- where the product per person and the consumption per person will both go up. Also refer to the considerations in the Introduction, rearding computer technology's effects upon the quantity of information. 10a1

These strongly imply that full-sized paper copies must be superseded by smaller, cheaper physical copy (microform) -- or ultimately, by electronic storage. 10b

Seems hard to imagine that a microform media won't eventually prevail over paper for the storage and dissemination of most of our published material. 10c

A TRIAL SHOT AT A "SIMPLE, BOLD, MASSIVE PLAN" 11

Network plan--franchises for Libraries, for vendors--standard interfaces so equipment manufacturers can offer competitive products. 11a

Perhaps might be worth while to examine the problems of integrating mixed cataloguing into a library -- with basic assumption of significant computer support. 11b

If had easy way to re-categorize relative to storage position (could re-publish shelf lists easily etc.) now much is lost by mixing different cataloguing systems? 11c

No item should be published without at least a registry number recorded (Books perhaps, ...) 11d

Obviously, where co-operative centralization has significant

benefit, should consider establishing co-op over the largest domain that is manageable (before diminishing returns) :: 11e

Seems unquestionable that at least this is U. S. National -- but a multi-action approach even more (e.g., all English-speaking countries? -- u.s. ...) 11e1

One form of diminished payoff/cost effect would be the difficulty of negotiating compromises of different subjective task attitudes (running the costs up). 11e2

E.g., might be most effective in the long run for smallest institution that could afford the "entrepreneural" venture to forge ahead, implement a solution (with as much dialogue and consideration as possible of other institutions' needs, approaches, etc.) within their own domain--then offer it to other institutions for a price that could effect a more-or-less shared-cost solution. 11e2a

Big stab: film all, one catalog, NET spec (Ned subsidy?) 11f

Cat-conversion--any change that pouring any (all) forms in (with tag as to which form) would still yield lots of initial value--allow graduate cleaning up on a highest-need basis? 11f1

How intelligent a software package (AI type) to make significant index conversion steps? 11f1a

How much help to an interactive conversion system? 11f1b

If Library 1 were to take in items catalogued under System B, could it possibly set up dual shelf-ordering systems such that browsing could be done in relatively convenient way -- 11f2

I.e., question is, how much would it cost to accommodate multiple cataloguing conventions in one library; and how much cleaner (easier, ...) could this be made with automation? 11f3

If put each biggest collection into a standard-for-it computer form, where had consistency between different forms (e.g., authors, ...) -- then offered services of

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