Transmittal to Nils Maras

ARPA Network Information Center   NIC 15326
Stanford Research Institute   3-APR-73
Menlo Park, California 94025   1

                                                                       2

TRANSMITTAL TO: Nils Maras
                   NORSAR
                   P.O. Box 51, 2007 Kjeller
                   NORWAY   3

FROM: Jeanne B. North (NIC)
                   Information and Station Agent Coordinator

                                                                       4

We have received notice that your office is now a Site on the
ARPA Network. As such, you will be receiving documents on
distribution from the Network Information Center (NIC).   5

We are sending you a core collection of existing documents,
including the following Functional Documents for which we will
provide updates: 6

    NIC 5145   Current Catalog of the NIC Collection   1-DEC-72   6a

    NIC 5150   Current Directory of Network Participants   29-JAN-73   6b

    NIC 7590   Network Information Center User Guide   2-MAR-73   6c

    NIC 7104   Current Network Protocols   22-JAN-73   6d

The Network Resource Notebook (NIC 6740) is in the process of
being revised. A copy will be sent to you in a couple of weeks.   7

We are also sending you a number of documents which you may need
as background (see list below).   8

We will be glad to supply copies of particular documents
indicated by a back arrow in the Catalog Listings, and will loan
or direct you to sources of other documents in the Listings.   9

Marcia Keeney, our Station Agent, accomplishes NIC distribution,
and has now put you on distribution for all documents sent to
Site Liaisons.   10

c: S. Crocker (ARPA)   11

Transmittal to Nils Maras

encl: NIC 7542   10507   11768   11924
            7750   11681   11626   12324   12

Transmittal to Nils Maras

(J15326) 6-APR-73 15:35;   Title: Author(s): North, Jeanne B. /JBN;
Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15326.NLS;5, 6-APR-73 15:26 LLL ;

TRANSMITTAL TO: Tom Lawrence

TRANSMITTAL TO: Tom Lawrence
                  Rome Air Development Center (ISIM)
                  Griffiss Air Force Base
                  Rome, N.Y.   13440.

FROM: Marcia Keeney (NIC)
                  Station Agent   1

At the request of Dirk vanNouhuys, I am sending you 24 copies of
NIC 14796, TNLS Quick Reference.   1a

TRANSMITTAL TO: Tom Lawrence

(J15328)   10-APR-73 18:23;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA   ; Sub-Collections: NIC   ; Clerk: KIRK   ;

ARPA Network Information Center   NIC 15329
Stanford Research Institute   6-APR-73
Menlo Park, California 94025   1

                                                                   2

TRANSMITTAL TO: The Director
                   R. J. Kirby
                   Ministry of Technology
                   National Physical Laboratory
                   Teddington, Middlesex, England   3

FROM: Marcia Keeney
                   Station Agent   4

                                                                   5

At the request of Larry Roberts, ARPA, I am enclosing a copy of
the following document: 6

   NIC 12982   ARPA Network Implications   6a

(J15329) 16-APR-73 07:30;   Author(s): Keeney, Marcia Lynn /MLK;
Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15329.NLS;3, 16-APR-73 07:28 LLL ;

TRANSMITTAL TO: Ed Pullen

TRANSMITTAL TO: Ed Pullen
                  Quantum Science Corp.
                  851 Welch Road
                  Palo Alto, California   94304

FROM: Marcia Keeney (NIC)
                  Station Agent   1

At the request of Jeanne North, I am sending a copy of the
ARPANET NEWS (Issue 1, March 1973, NIC 14797)   1a

TRANSMITTAL TO: Ed Pullen

(J15330) 18-APR-73 19:19;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

ARPA Network Information Center   NIC 15329
Stanford Research Institute   6-APR-73
Menlo Park, California 94025   1

                                                                   2

TRANSMITTAL TO: Lawrence Roberts
                  ARPA
                  1400 Wilson Boulevard
                  Arlington, Virginia   22209   3

FROM: Marcia Keeney
                  Station Agent   4

                                                                   5

At the request of Robert E. Kahn, your name has been placed on
the ARPANET Satellite System Group distribution list.   6

I am enclosing the ASS Notes which have been issued to date.
Notes 13, 14, and 23 are obsolete. You will receive all new ASS
Notes as they are distributed.   7

encl: 8

11283	11284	11285	11286	11287	11288	11289	8a
11290	11291	11292	11293	11294	11616	11624	8b
11862	11865	11866	11867	12166	12534	12734	8c
12735	12736	12744	12759	13044	13150	13147	8d
13469	13647	11880	14790				8e

Transmittal to Connie Rosewall

(J15332) 16-APR-73 07:35;   Title: Author(s): Keeney, Marcia Lynn
/MLK; Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15332.NLS;1, 16-APR-73 07:34 LLL ;

Transmittal to Leonard Kleinrock

ARPA Network Information Center   NIC 15335
Stanford Research Institute   6-APR-73
Menlo Park, California 94025   1

                                                                   2

TRANSMITTAL TO: Leonard Kleinrock
                   Computer Science Department
                   3732 Boelter Hall
                   Los Angeles, California   90024   3

FROM: Marcia Keeney
                   Station Agent   4

                                                                   5

At your request I am sending NIC 14212 Packet Radio Temporary
Note #24, Throughput in Carrier-Sense (Autoslot) Packet Radio
Systems.   6

Transmittal to Leonard Kleinrock

(J15335) 16-APR-73 07:38;   Title: Author(s): Keeney, Marcia Lynn
/MLK; Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15335.NLS;2, 16-APR-73 07:37 LLL ;

Transmittal to Schuyler Stevenson

ARPA Network Information Center   NIC 15336
Stanford Research Institute   6-APR-73
Menlo Park, California 94025   1

                                                                   2

TRANSMITTAL TO: Schuyler Stevenson
                   Department of Commerce NOAA
                   325 S. Broadway
                   Boulder, Colorado   80302   3

FROM: Marcia Keeney
                   Station Agent   4

                                                                   5

At your request I am sending NIC 11973, The BCPL Reference
Manual.   6

Transmittal to Schuyler Stevenson

(J15336) 16-APR-73 07:41;   Title: Author(s): Keeney, Marcia Lynn
/MLK; Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15336.NLS;3, 16-APR-73 07:39 LLL ;

ARPA Network Information Center   NIC 15342
Stanford Research Institute   9-APR-73
Menlo Park, California 94025   1

                                                                   2

TRANSMITTAL TO: Bertrand Cochi
                  Stanford University
                  Electronics Research Laboratory 233C
                  Stanford, California   94305   3

FROM: Marcia Keeney
                  Station Agent   4

                                                                   5

At your request I am sending NIC 11772, the MACSYMA User's Guide.   6

Transmittal to Bertrand Cochi

(J15342) 16-APR-73 07:45;   Title: Author(s): Keeney, Marcia Lynn
/MLK; Distribution: /SA; Sub-Collections: SRI-ARC; Clerk: LLL;
Origin: <LANE>NIC15342.NLS;4, 16-APR-73 07:43 LLL ;

TRANSMITTAL TO: Nancy J. Neigus

TRANSMITTAL TO: Nancy J. Neigus
                   Bolt Beranek and Newman Inc.
                   50 Moulton Street
                   Cambridge, Massachusetts 02138

FROM: Marcia Keeney (NIC)
                   Station Agent   1

At your request, I am sending 12 copies the TNLS quick reference
card, NIC 14796:   1a

TRANSMITTAL TO: Nancy J. Neigus

(J15345)   18-APR-73 19:13;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

TRANSMITTAL TO: Jean Iseli

TRANSMITTAL TO: Jean Iseli
                  MITRE Corporation
                  Information Systems Dept., W140
                  Westgate Research Park
                  McLean, Virginia   22101

FROM: Marcia Keeney (NIC)
                  Station Agent   1

At your request, I am sending 15 copies the TNLS quick reference
card, NIC 14796:   1a

We are unable to send you the TENEX manual as we do not
distribute this document.   You may order them from BBN.   1b

TRANSMITTAL TO: Jean Iseli

(J15346)   18-APR-73 19:16;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA   ; Sub-Collections: NIC ; Clerk: KIRK   ;

TRANSMITTAL TO: Robert Lieberman

TRANSMITTAL TO: Robert Lieberman
                  Naval Ship Research and Development Center
                  Code 183
                  Bethesda, Maryland 20034

FROM: Marcia Keeney (NIC)
                  Station Agent   1

At the request of Jim Norton, I am sending 6 copies the TNLS
quick reference card, NIC 14796:   1a

TRANSMITTAL TO: Robert Lieberman

(J15347) 18-APR-73 19:09;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

TRANSMITTAL TO: Anita Coley

TRANSMITTAL TO: Anita Coley
                  University of California at Los Angeles
                  Computer Science Department
                  3732 Boelter Hall
                  Los Angeles, California 90024

FROM: Marcia Keeney (NIC)
                  Station Agent   1

At your request, I am sending 6 copies the TNLS quick reference
card, NIC 14796:   1a

TRANSMITTAL TO: Anita Coley

(J15348) 18-APR-73 19:14;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

TRANSMITTAL TO: Tom Lawrence

TRANSMITTAL TO: Tom Lawrence
                   Rome Air Development Center (ISIM)
                   Griffiss Air Force Base,
                   Rome, New York 13440

FROM: Marcia Keeney (NIC)
                   Station Agent   1

At your request, I am sending the following documents: 1a

    NIC 12838   University network plans progressing . . . slowly
    NIC 12906   Arpa Goes Commercial
    NIC 12980   THE FUTURE OF COMPUTER UTLITIES
    NIC 12982   ARPA Network Implications
    NIC 12984   A Report On A Study of Selected Regional Computer
    Networks in the United States
    NIC 14758   COMPUTER NETWORKS: A POWERFUL NATIONAL FORCE   1a1

NIC 13975, Interactive Television by Bair, is out on loan to Vint
Cerf of Stanford. When he returns it I will send you a copy.
NIC 13998 Computer Networks is a book and is too large to copy.
Since we have only 1 copy of this book whcih we do not loan out,
I suggest you contact the publisher, Prentice-Hall.   1b

1

TRANSMITTAL TO: Tom Lawrence

(J15349) 18-APR-73 19:12;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

TRANSMITTAL TO: Prof. D. J. Doole

TRANSMITTAL TO: Prof. D. J. Doole
                   University of Bristol
                   Computer Center, School of Mathematics
                   University Walk
                   Bristol BS8 1TW, England

FROM: Marcia Keeney (NIC)
                   Station Agent   1

At the request of Steve Crocker, I am sending the following
functional documents: 1a

    NIC   7104   ARPA Network Current Network Protocols
    NIC   6740   ARPA Network Resources Notebook
    NIC   5150   ARPA Network Current Dir. of Network Participants
    NIC   5145   Current Catalogue of the NIC Collection
    NIC   7590   Network Information Center User Guide   1a1

TRANSMITTAL TO: Prof. D. J. Doole

(J15350) 18-APR-73 19:07;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

TRANSMITTAL TO: Ronald Sherwin

TRANSMITTAL TO: Ronald Sherwin
                   Department of International Relations
                   University of Southern California
                   Los Angeles, California   90007

FROM: Marcia Keeney (NIC)
                   Station Agent   1

At the request of Jeanne North, I am sending the following
documents which concern the ARPANET.   1a

     NIC   7542
     NIC   7750
     NIC 10507
     NIC 11681
     NIC 11768
     NIC 11626
     NIC 11924
     NIC 12324   1a1

TRANSMITTAL TO: Ronald Sherwin

(J15351) 18-APR-73 19:08;   Title: Author(s): Keeney, Marcia Lynn /MLK
; Distribution: /SA ; Sub-Collections: NIC ; Clerk: KIRK ;

Transmittal to Station Agents -- 80

NIC 15354
                                                  19 APR 73   1

                                                                    1a

Enclosed: 1b

     NIC 15355   *NWG/RFC #490   Surrogate RJS for UCLA-CCN   1b1

                                                                    1c

*sent to Liaisons   1d

Transmittal to Station Agents -- 80

(J15354) 18-APR-73 18:02;   Title: Author(s): North, Jeanne B. /JBN ;
Distribution: /SA   MDK   JEW ; Sub-Collections: NIC ; Clerk: KIRK ;

Kirk ... Your instructions in <TENEX-DOC>TUG should include a way
to get the "table of contents",   e.g.   1

   *p[rint] b[ranch] .0 CR   xbm   CR   1a

Alternatively the table of contents could be abstracted into the
instructions branch and printed there, either automatically or
with a command such as   2

   :p[rint] b[ranch] .contents CR CR   2a

where "contents" might look like this, say: 3

   (CONTENTS)   Tenex User Guide   3a

      Business   3a1

         COBOL   3a1a

      Games   3a2

         CHESS
         DOCTOR
         LIFE   3a2a

      Network Oriented Systems   3a3

         FTP
         MLTNET
         NETDMP
         NETSTAT
         READMAIL
         RJS
         SNDMSG
         TELNET   3a3a

      Privileged Systems   3a4

         ACCT10
         CHKPNT
         DLUSER
         NOTIFY
         SETMRP
         ULIST   3a4a

      Science and Engineering   3a5

         ALGOL

tug

(J15360) 28-MAR-73 10:25;   Title: Author(s): Kudlick, Michael D.
/MDK; Distribution: /kirk ; Sub-Collections: SRI-ARC; Clerk: MDK;
Origin: <KUDLICK>KIRK.NLS;2, 28-MAR-73 10:23 MDK ;

NMDT —— Meeting report — March 26, 1973
Participants: JGM, CHI, CFD   1

Agenda: 2

Documentation methodologies were discussed. We tried to
develop a top down model for documentation which could be of
use in designing as well as describing the system. In our
definitions, the word module" corresponds roughly to
Dijkstra's "level of abstraction" concept. We developed the
following model for module documentation and will refine it as
experience dictates: 2a

<modulename>MODULE   2a1

External Structure: % how the module appears to its
external world %   2a1a

Function: % what the module does — in general terms %   2a1a1

Ports: % external communication paths %
Signals: % signals which "stick out" of the module
%   2a1a2

Internal Structure: 2a1b

Contained Modules   % which modules does this one
contain? %
Interconnections: % how are the contained modules
hooked together —— what are their communications
topology and interface languages? %
% why are the modules so connected? %   2a1b1

The notations for describing the items in this outline are
not fully developed, but it appears that there may be
advantages to making the descriptions in some potentially
machine readable form. It may be possible for the
configuration network described by the documentation data
base to actually drive the process binder in the system for
example.   2a2

The notion of describing those signals which "stick out" of
the module implies that some renaming or trapping of
extraneous signals must be performed by the module.   2a3

Plans: 3

1). Document our model of NLS using the above conventions.

NMDT meeting report - March 26, 1972

2).   Revise and extend the conventions where necessary.
3).   Distribute descriptions of our proposed documentation
conventions and NLS model for wider feedback.   3a

Next meeting: 4

    Thurs, March 29 10:30 AM at XPARC   4a

NMDT meeting report - March 26, 1972

(J15361) 28-MAR-73 11:45;   Title: Author(s): Dornbush, Charles F.
/CFD ; Distribution: /NMDT NMRT ; Sub-Collections: SRI-ARC NMDT NMRT;
Clerk: CFD ;

Visit of Lawrence Livermore Lab Graphics Group on Friday 30 March

There will be a presentation by them at about 11:00.   Lunch will
follow for those interested.

Visit of Lawrence Livermore Lab Graphics Group on Friday 30 March

A programming group of about seven people from Lawrence Livermore
Laboratory will be visiting ARC on Friday. They are interested
in graphics. The head of the group, Steve Levine, worked here in
the 3100 days and is interested in our developments.   1

They will arrive at about 10:00 AM. At that time I will give
them a brief demonstration of NLS.   2

At 11:00, they will give a presentation of their project. All
interested people are urged to attend.   3

We will go to lunch at 12:00. (If you wish to go, please see
me.)   4

Doug and Dick will speak to them in the afternoon about possible
SEAS and utility participation.   5

Visit of Lawrence Livermore Lab Graphics Group on Friday 30 March

(J15362) 28-MAR-73 13:13;   Title: Author(s): Lehtman, Harvey G. /HGL;
Distribution: /npg   rww   jcn   mdk   dce   pr ; Sub-Collections: SRI-ARC
NPG; Clerk: HGL;
Origin: <LEHTMAN>MESS.NLS;1, 28-MAR-73 12:29 HGL ;

RESOURCE NOTEBOOK — FUTURE PLANS (RESPONSE TO RWW 14867, 3-2-73)   1

INTRODUCTION   2

Overall plans for the Resource Notebook were outlined in journal
item 12425. Essentially this plan is still being followed with
some changes in emphasis as noted below.   3

CURRENT STATUS   4

Since ICCC a DRAFT copy of the Resource Notebook has been sent
out for 12 server sites. Eight other server-site write-ups will
be sent out shortly. Three of the twelve sites have already
returned final versions.   5

Query language has been revised to handle several smaller files
instead of one large one. (This was a major redesign of both
query and the data base). Also previous problems in both query
and NLS have been solved so that the user now has a working,
easily-accessible, online Resource Notebook as well as a general
purpose program for accessing other data bases.
(Ljournal,15147,1:wy)   6

The single-file online version of the Resource Notebook has been
broken into separate site files, and the data base reorganized so
that an online user has fewer choices to make before reaching
data. Tabs have been removed from all Resource Notebook text,
and a more consistent input format is now in use.   7

Preliminary plans for interfacing with users and speeding up data
collection from sites have been made and will be implemented
soon. (See below).   8

A user program for inserting output processor directives into the
online version of the Resource Notebook was written by HGL and
NDM, and is now being used to produce camera-ready, formatted
copy for the offline, hardcopy version. (The same program can
also be used to add COM directives to the online Resource
Notebook files later.)   9

A revised questionnaire for gathering data for the Resource
Notebook has been completed and journalized, and a mechanism for
initiating network questionnaires and related surveys has been
implemented.   10

Transition to the new NIC management has been completed. (I
believe that MDK is now familiar with any progress and all

Resource Notebook - Future plans (Response to RWW 14867)

problems concerning the Resource Notebook that I am aware of at
this time.)   11

                            FUTURE PLANS   12

I. Query Language Design and Maintenance   13

   JFV is evaluating several suggestions for modifications to or
   redesign of the existing query language within the context of
   overall information retrieval needs. A group ident,
   NIC-QUERY, has been set up to receive suggestions, and so far
   these features of interest to production of the Resource
   Notebook are being considered for the next version of query: 13a

      1. Linking to files outside of query. (This could
      present
         serious problems of file management if links were
      changed or
         updated, and so needs to be carefully reviewed.)   13a1

      2. Eliminating either the 'bring' or the 'show' command so
      that
         only one command is used instead of two.   13a2

      3. Finding a method whereby a user may choose to type
      either a
         number or the actual text of a statement name when he
      is
         presented a 'menu' from which to select in query. This
      might
         possibly be done by some statement name format such as:
         (1/ADDRESS)   13a3

      4. Devising a method whereby an 'editor' of online files
      can go
         from Query to the actual NLS file to make changes
      without
         having to actually 'quit' Query execution.   13a4

      5. Inserting default viewspecs which will apply
      automatically to
         the file being queried.   13a5

      6. Reinstating the feature that allows an experienced user
      of
         query to enter a file 'from the side' (or in the
      middle)
         rather than having to work down from the top of the

file.

(This will be simple when only one 'bring' or 'show' command

exists.)

13a6

While new design features for a future version of the query language are being considered, the programs for the current version will be maintained in working order for users. No new version will replace the current version unless it has been carefully tested.

13b

To help accomplish this goal a series of benchmarks for testing query and the various data bases controlled by it is being set up by EJF. This will aid in checking out new features in query and maintaining the data bases. Query will eventually be expanded to cover several of the data files now covered by LOCATOR. Periodic checks will need to be made on all such files to make sure that they are functioning properly under query and that the instructions are current.

13c

II. Data Gathering

14

In accordance with the suggestions of Col. Ed Schelonka, regional districts wil be set up throughout the country. Regional representatives will be appointed to collect data for an assigned geographical area and will feed information into EJF at NIC. A detailed plan for organizing this activity is being drafted now and will be finalized within a week or two.

14a

The following represent the various areas for which specific data has either not yet been collected or for which data has not yet been organized for use in the Resource Notebook:

14b

   1.   User Programs

14b1

More information is needed about user programs available for use on the Arpanet. Many sites do not know what user programs they have available. Others do not have enough help and/or interest to document all of their user programs. Therefore, collecting this material will be a lengthy process. Susan Poh, Mitre-TIP, has volunteered to share information she has gathered with us, and the regional representatives will be asked to emphasize this area.

14b1a

   2.   Data Bases

14b2

Almost no information has been collected about data

bases available on the Arpanet. This information will
be treated similarly to user programs, but will be given
a lower priority. (See 1 above.)   14b2a

3. Accounts   14b3

Bert Sutherland, BBN-TENEX, is gathering information for
ARPA pertaining to accounts and accounting problems. He
has agreed to share his findings with us, but at this
time we do not know what his approach will be.   14b3a

4. Matrix Tables   14b4

Mitre-TIP is very interested in producing offline copies
of matrices of such things as: who has what user
programs, who has what computer, who has what operating
system, etc. Susan Poh has agreed to push this activity
and to check with Nancy Neigus, BBN-TENEX. (Nancy has
already put together several useful tables for network
use.) We will send any copies of online matrices that
we do to them, and they will send us any hardcopy
versions they produce.   14b4a

These matrices will serve as index guides to more
detailed information in the Resource Notebook.   14b4b

5. Referenes   14b5

References received from sites are almost always badly
cited and incomplete. We are slowly tracking down
documentation and reference citations, but much more
still remains to be done. Regional representatives will
be asked to help provide some of the detail needed.   14b5a

III. User Interface   15

A user interface group is being planned for the near future.
Although plans are not finalized yet, the group will probably
consist of site liaison, regional representatives, and other
interested parties. Critics will be encouraged to send input
to the NIC either directly, or through a member of the users
group; and the users group will be asked to provide their own
criticism and suggestions.   15a

IV. Revising the Online Database Format   16

Once the DRAFT hardcopy of the Resource Notebook has been
completed and disseminated, we would like to simplify the

organization of statement headings in both online and hardcopy
versions of the Resource Notebook. This cannot be done
immediately because the DRAFT version would be in two
different formats. Likewise, we cannot immediately change the
online version because the same file is used to produe the
hardcopy. Therefore, the transition can most easily be made
between hardcopy editions. Data will remain the same but its
organizization will be less structured and better organized.
The following breakdown is a composite of suggestions made by
MDK, EJF, and Mike Padliipsy, MIT-MULTICS for a revised
format: 16a

    GENERAL INFORMATION   16a1

        Function
        Address
        Personnel
        Interests   16a1a

    SYSTEM USE   16a2

        Login
        Logout
        Control Characters
        Commands
        Help
        Accounts
        Service Schedule
        Protocols   16a2a

    RESOURCES   16a3

        Hardware
        Operating System
        User Programs
        Data Bases   16a3a

    DOCUMENTATION   16a4

        References
        Order Information   16a4a

This format is not finalized and feedback would be
appreciated. Changeover from the old system to the new will
be carried out by LLL and should proceed quickly and smoothly
once the format has been decided upon.   16b

v. PSO Interface   17

Resource Notebook - Future plans (Response to RWW 14867)

Now that the Resource Notebook file has been broken into
multiple files and the format has been standardized, interface
with PSO is becoming simpler. Linda Lane has been doing a
very nice job of inputing new data and making editing changes.
A template of statement names will be entered under each site,
so that all LLL will have to do each time new data comes in,
is insert it at the proper spot in the template. EJF will edit
the input and give the editing changes to LLL to input. LLL
is familiar with the structure of most of the tables in the
Resource Notebook and will be able to take over more of the
work as time permits.   17a

VI. Offline Production of the Resource Notebook   18

Offline production of documents at this point is a very slow
process and the results are not satisfactory. The best
turnaround time we can count on from Report Production is
about 1 1/2 to 2 weeks and the work is often sloppy. Each
site writeup must be printed through the output processor in
order to get camera-ready copy for multiple-copy production.
Generally the printing must be done at night due to O-4, and
the copy is frequently anything but 'camera-ready'.   18a

DDSI has not yet demonstrated that they can handle volume work
and at present the quality of printing is not satisfactory.
It is also not clear how well a print shop in Los Angeles can
handle our day-to-day production problems.   18b

This area of endeavor is presently a bottleneck. We intend to
investigate several approaches and see which approach works
best.   18c

VII. Other Burning Problems   19

The concept of SERVER, USER, TIP as it applies to the Resource
Notebook needs to be redefined. Sites classed as SERVERS
often do not care to offer service to all comers, and this is
causing some confusion and hard feelings amongst users.   19a

VIII. Production schedules   20

l. Completion of the DRAFT copy of Resource Notebook - 1-2
months   20a

    a. Finish remaining server sites - 2 weeks (counting
    report
        production)   20a1

b.   Collect info and finish user sites - 2-6 weeks depending upon
     feedback from sites and amount of material included.   20a2

c.   Collect info and finish TIP sites - see b,   20a3

2. Review Resource Notebook   20b

   a.   Physical format   20b1

   b.   Logical format   20b2

   c. Online/offline production   20b3

3. Production of the final version of the Resource Notebook - Aiming
   for a June deadline; however, so many things affect this such as
   how much the Regional Coordinators contribute, what cooperation
   we can get from sites, etc., that this date is tentative.   20c

   a.   Debug the online data base - 2 days for current base,
        continuous effort for additions.   20c1

   b.   Incorporate feedback from returned drafts of site writeups
        and questionnaires - see note at 2 above   20c2

   c.   Produce and distribute hardcopy version - see note at 2
   above   20c3

4. Set up system of regional coordinators - Within the next two
   weeks; a meeting will be called to handle items a, b, and c
   below.   20d

   a.   Decide on mechanism for issuing data-gathering questionnaires
        - timing, content, what constitutes an 'official'
        questionnaire, etc.   20d1

   b.   Coordinate design and collection of information for data
        matrices.   20d2

   c.   Decide what overlap, if any, there wlll be between the
        regional coordinators and the users group.   20d3

Resource Notebook — Future plans (Response to RWW 14867)

5. Set up users group for feedback on query design, data base
   structure, documentation, etc..   20e

Resource Notebook - Future plans (Response to RWW 14867)

(J15363) 28-MAR-73 10:09;   Title: Author(s): Feinler, Elizabeth J.
(Jake) /JAKE; Distribution: /mdk rww jfv ; Sub-Collections: SRI-ARC;
Clerk: JAKE;
Origin: <FEINLER>PLANS.NLS;8, 28-MAR-73 9:56 JAKE ;

remaining work to bring up 131

get exec 1.50 running	1
get new swpmon	1a
get new io	1b
get new impdv (?)	1c
get new netsrv (?)	1d
do thorough nls checkout	2
get rid of -4 calls to gtjfn	2a
new load	2b
check the following new jsies thoroughly	3
adviz	3a
erfct	3b
lsym	3c
check out several combinations of autostartup	4
check out checkdsk	5
get needed new subsystems	6
uddt	6a
sddt	6b
mddt	6c
error.mnemonics	6d
check out xcore combinations	7
starting without xcore	7a
turning off xcore dynamically	7b

remaining work to bring up 131

(J15364) 28-MAR-73 3:20;   Title: Author(s): Victor, Kenneth E. (Ken)
/KEV; Distribution: /dcw   chi   dia   ; Sub-Collections: SRI-ARC; Clerk:
KEV;
Origin: <XTENEX>131-TODO-LIST.NLS;3, 28-MAR-73 3:20 KEV ;

Augmentation Research Center and Network Information Center:
Video Tape

(J15365) Hard Copy--Location: ARC Video Tape Library 28-MAR-73 15:06;
; Title: Author(s): Norton, James C. , Watson, Richard W. , Van
Nouhuys, Dirk H. , Auerbach, Marilyn F. , Lehtman, Harvey G. , Bass,
Walt /JCN RWW DVN MFA HGL WLB; Distribution: /; Sub-Collections:
SRI-ARC; Clerk: KIRK;

On Entering Documents and/or Abstracts into the NIC Collection

Mil ...   1

Confirming our conversation earlier today (28-Mar-73) concerning
privacy of information, I would like you to check as follows
before entering information into the NIC collection --- i.e.,
into XDOC, into the Catalog system, into the NIC journal,
whatever ---:   2

1) If the information has already been published in the open
literature, then a citation and abstract can be entered into our
system.   3

2) If the information has NOT been published in the open
literature --- for example, it is a personal letter or
memorandum, or is a document whose re-dissemination or
re-publication would violate copyright laws --- then it is
necessary to get permission to enter an abstract and/or to enter
the full text.   4

    The permission must be obtained either from the author if it
    is a private correspondence, or from the publisher if it is a
    privately published document.   4a

    Please explain the nature of our use as briefly and accurately
    as possible, particularly that the citations may be read by
    any one who has access to NIC documents.   4b

On Entering Documents and/or Abstracts into the NIC Collection

(J15366) 28-MAR-73 17:58;   Title: Author(s): Kudlick, Michael D.
/MDK; Distribution: /mej   rww   jbn   jcn   dce ; Sub-Collections:
SRI-ARC; Clerk: MDK;
Origin: <KUDLICK>MEJ.NLS;4, 28-MAR-73 17:52 MDK ;

Envelopes

Susan ... Thanks for your information on the envelope costs.
Your suggestion that we wait till the next SRI order is the right
thing to do in my opinion, too. Would you or Cynthia please make
a note on your calendar so that six months from now (or whenever)
the deadline for ordering isn't missed? ... Mike   1

Envelopes

(J15367)   28-MAR-73 9:07;   Title: Author(s): Kudlick, Michael D.
/MDK; Distribution: /srl   jbn   ; Sub-Collections: SRI-ARC; Clerk: MDK;

NLS-Boston

I hope I got the title right; it has been a long time.

NLS-Boston

I hope that you will be doing the Boston part of the NLS tour in
person. I certainly expect you, and will be sorely disappointed
if you don't make some of your time available. I can pay up on
lunch and dinner. Hear from you before then I hope.
Any progress on "Blind LIght"?   1

NLS-Boston

(J15368)   28-MAR-73 13:10;   Title: Author(s): Neigus, Nancy J. /NJN;
Distribution: /DVN; Sub-Collections: NIC; Clerk: NJN;

BOB, HAVE A LONG RJE TYPE QUESTION FOR YOU, BUT BEFORE I GET
CARRIED AWAY, IS THIS THE BEST MEDIUM FOR SENDING YOU MESSAGES?
OR HAVE YOU A PREFERED HOST FOR RECEPTION? BEST ANSWER TO ME VIA
SNDMSG OR SUCH TO BBN-TENEX (USER BRESSLER)   BOB.   1

(J15369)   28-MAR-73 10:09;   Author(s): Bressler, Robert D. (Bob)
/RDB2; Distribution: /RTB; Sub-Collections: NIC; Clerk: RDB2;

15369 Distribution
   Braden, Robert T. ,

1

Cataloging and the ARC/NIC Collections

To: MDK   Copies to: DCE, JBN, JCN, RWW   1

Re: Your Memo of 28 March 1973, 15366, Concerning Entering
Documents and/or Abstracts in the NIC Collection   2

Several points concerning the subject of your memo I feel should
be brought out: 3

(1) You mention entering documents into the NIC Collection and
then qualify "i.e., into XDOC, etc." I would like to sure of
your exact meaning. The NIC Collection is only about 45% of
the cataloged and online material and probably no more than
about 30% of the entire collection that is not yet on line in
a usable form. The cataloging is done more or less
"together", and the material is stored in the same online
source files, however, no catalog has yet been issued (since a
KWIC printout in August 1968) except on the NIC portion of the
collection. Are you saying that these rules should apply to
THE NIC COLLECTION (that 30-45%) or are you saying that the
rules should be applied to the entire online (and to be put
online) collection?   3a

If the latter is your meaning (rules to be applied to the
whole thing), then there is much material coded, online,
and filed that violates this rule. For instance, a good
deal of Doug's private correspondence, and a good deal of
private correspondence between two other people, a copy of
which Doug has acquired from some source or other
(unofficially), has been coded and is online, or is in the
file and is yet to be put online. Some of this material is
of rather questionable nature in that statements are made
in some of this correspondence which I am sure the writer
would much rather not have published in an open catalog.
There are copies of rough drafts of documents, books,
papers, that if we publish them, it will cancel the
writer's ability to acquire a legal copyright (since we
would have already published the material before the
publisher he intended to use had the opportunity to publish
it) and could cause considerable embarrassment and hardship
to the writer for this reason...if not for the reason that
we are publishing a rough draft that he would prefer the
public not to see.   3a1

There are applications for employment coded into the
catalog, resumes, biographical data which is certainly of
private nature. There are many SRI Contact Reports issued
by the SRI Executives for use by the SRI Marketing
Division, which contain highly SRI confidential statements

about possibility of selling contracts, organizations'
budgets, private tips given these people about
possibilities of selling a proposal, personal opinions
about the worth of organizations and companies, private
opinions about the dependability of executives and contacts
in other organizations and their usefulness to SRI. This
is material that in any organization I have ever worked in
would be considered highly confidential. If this material
is published in an open catalog it could possibily in some
cases prove highly embarrassing to the writers of these
reports and possibly cause the disruption of valuable
commercial and industrial contacts because of the lack of
privacy afford these contacts. The business of the world
may some day be conducted in the complete open, but if we
try to initiate the procedure now it could cause serious
damage to our employers.   3a2

There are SRI proposals coded into the XDOC material which
contain the budget, salary, and financial portions of the
proposals. This material in other organizations is
considered highly Company Confidential. A proposal is a
bid. Financial information on bids, if published openly
before the bid is let, can lose the bid to someone who,
with this information at his disposal, can underbid. The
financial health of SRI (or whatever organization issued
the proposal) is involved in publishing this information.
Do we have the right to XDOC and publish this material? Do
we have the right to publish this kind of material even
after the bid is issued to whoever gets it -- the financial
information, with a bit of brief pencil work can give a
competitor very close insight on: 3a3

    Executives' salaries who are listed in the proposal,

    Researchers' salary ranges who are listed in the
    proposal,

    General research cost information which is highly
    valuable to a competitor in future bidding,

    General financial health of the organization (a good
    cost analysis expert can tell you volumes about your
    organization from how close to cost you bid).   3a3a

(2) If it is the decision that some or all of the kinds of
material mentioned above should not be a part of the XDOC/NIC
Collection, then should we make some effort to examine the
collection for such material and remove this kind of material

from the collection? If removed from the collection, it is
assumed that the coding for those items would be deleted from
the online catalog, the number abandoned, and the hard copies
filed elsewhere. Decisions on this and procedures to
accomplish it will be needed. Decisions will also be needed
on the type of material to be included in the present
collection(s) and what material should be accepted and what
material be refused for future inclusion in the collection.   3b

(3) You mention getting an author's (or publisher's) approval
for coding and abstracting books or other copyrighted
material. It is not legally necessary to get either an
author's or publisher's approval to catalog or abstract a book
or copyrighted material. Publishers/authors are only too glad
to have their work recognized and brought to the attention of
the public. HOWEVER, there is presently a very large hassle
in the courts concerning COPYING copyrighted material. Note
that there is a complete legal difference between coding and
abstracting material and copying and excerpting this same
material. Coding and abstracting are the legal possession of
the coder and abstracter (or his employer), since they are the
creation of said coder or abstracter, in which he uses his own
words and phrases (or those furnished for such use by the
author, publisher, or the publisher's press agents).   3c

(4) Concerning copying copyrighted material, as mentioned
above -- as part of the pressure of "public opinion" being
exerted to settle the copying hassle, librarians almost
unanimously are refusing to abide by the "letter of the law"
and not xerox journals, documents, and parts of books. There
have been a number of conflicting judgments set down by the
courts, and one of them has been that "a copy may be made for
individual use in scientific research" of any copyrighted
material, without any approval or notification whatsoever.
Jeanne and the whole NIC set up are conducting their business
under this rule, and I quite agree. The advent of the Xerox
machines obsoleted the copyright laws, and it is up to modern
technology to find a better way of disseminating scientific
information than through the antiquated publishers' profit
system.   3d

   However, there are a few so-called publishers whose works
   we copy with cheerful abandon and disseminate to the users
   of NIC, that we might reconsider our decisions -- not from
   any agreement with the copyright laws (we have not yet been
   questioned on it, but I feel that it is likely that we will
   if we continue), but from the fact that we would like to
   maintain a courteous interchange of good will with these

Cataloging and the ARC/NIC Collections

particular "publishers", and if we continue to cut them out
of their sales, we are likely to lose their good will.
These people are BBN (who profit from sales of their
documents), MIT (same), DEC (same), and possibly one or two
more. This would be purely a matter of courtesy to an
organization with whom we are closely connected in
business.   3d1

I am very was glad to see that some attention is being paid to
what I have always felt was a danger area in our work. I will be
glad to hear from you on what you feel should be done.   4

Cataloging and the ARC/NIC Collections

(J15370)   29-MAR-73 8:37;   Title: Author(s): Jernigan, Mil E. /MEJ;
Distribution: /MDK JBN JCN DCE RWW; Sub-Collections: SRI-ARC; Clerk:
MEJ;
Origin: <JERNIGAN>DOCUMENTS.NLS;1, 29-MAR-73 8:33 MEJ ;

NP for home directory of NP and BUGS

The NP (and bugs?) files need to be in a directory other than NLS
so that the journal can automatically send mail to them. The
most logical choice, I think, is <DOCUMENTATION>. The only
draw-back would be that it is a long name to type for users who
want to see what suggestions have been made.   1

However, this problem has occured before and the solution in the
case of <CAT-WORK> was to shorten the directory name to <CAT>.
In anticipation of this problem, the new file of TENEX
docmentation was called <TENEX-DOC>. I think if <DOCUMENTATION>
is objectionable to house BUGS and NP because of the length of
it's name, the name should be changed to <DOC>.   2

NP for home directory of NP and BUGS

(J15374) 23-MAR-73 20:58;   Title: Author(s): Kelley, Kirk E. /KIRK;
Distribution: /np ; Sub-Collections: SRI-ARC NP; Clerk: KIRK;

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart, Watson, Humphrey, Keirstead, Parker and Wensley

In my records this was submitted about 1 Apr 73; doesn't show in index, so I am re-submitting. (Note: as of 25 Aug 73, we haven't pursued this particular approach any further)

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart,
Watson, Humphrey, Keirstead, Parker and Wensley

Meeting 29 Mar 73, 10 to 11:50, ARC Conf room: called and chaired by
DCE, attended by Tom Humphrey, Ralph Keistead, Donn Parker, John
Wensley, and Dick Watson.   1

Passed out (pre-journal form) of (15377,). They already had been
given copies of (12427,), (12445,), (13537,), and (14724,),   2

My purpose in this meeting was to explain our goals and needs, and
to explore the way in which they (and others in SRI) could help in
the "marketing" activity for a SEAS community.   3

Described general situation w.r. to launching community development;
interest in doing it initially with a few, consciously pursued types,
of which software-development teams is a very important one. (pretty
much as in --- 15377,2). Then had a general multi-way discussion for
the rest of the time. Below are some special items from that
discusion.   4

It was announced that RWW would be the prime pusher from within ARC
toward exploring the possibilites, helping get off the ground, etc.,
with respect to a special community aimed at Workshop evolution for
software. We briefly described the implicit SEAS work within our
group over the years, and the explicit work currently being pushed by
Harvey LEhtman and Ken Victor, all of which would become core
substantive material for dialogue with potential candidates.   5

In our discussion, it soon became clear that what we were looking
for, at least initially, were a few "key guys, in key spots, within
key organizations, that were in key application domains." E.g.,
there were particular people mentioned in software-system and
vice-preseidential spots, in Bank of America, for banking
applications (and also in stock exchange area, and in insurance (e.g.
Equitable Life of N.Y.). Some organizations consider themselves as
leaders, and such a self-image would be of value to us here.   6

We developed a tentative plan -- to hold a one- or two-day workshop
here, for a group of selected people, explicitly on the possibilities
for Augmented Knowledge Workshops for their software teams, for their
participating in a community of such, etc.   7

   Toward this end, we planned to meet again at 10:00 a.m., Tuesday,
   April 10, to demonstrate, explain, etc. the specifics of what we
   are proposing for these clients. Dick Watson will organize ARC's
   presentation. (Harvey and Ken will play key parts in this
   interchange. Apologies to them about not including them in this
   preliminary meeting; it was a stage in a developing series of
   interactions with SRI people that progressed further than I

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart,
Watson, Humphrey, Keirstead, Parker and Wensley

anticipated, and as it turned out, it would have been well
worthwhile for them to particpate.)   7a

Also, DCE will look for other SRI people who would have
experience, interests, contacts, etc. that are relevant here.
They would have a chance for similar (or the same) familiariziang
experience.   7b

Between ARC and our SRI collaborators, we will coordinate a campaign
of phone calls, literature development and sending, perhaps personal
calls, etc. toward finding the right number and right kind of people
who would come; set up the time, and follow through with preparations
for the workshop.   8

We in ARC would like to have a number of non-ARC SRI people
prepare specific presentations to give; it seems important to us
that it isn't just ARC guys that do all the describing and
explaining -- we are too much "inside" and "saturated in" the
proposed new actiity domain to do the best job.   8a

One of the purposes of the demonstration-description sessions
mentioned above is to help prepare these SRI collaborators for this
participaton. Another reason is so that they can feel commmfortable
in encouraging their personal acquaintances to come to the workshop;
i.e., that they understand what is being proposed, and feel that it
is really worth the guy's time.   9

Miscellaneous notes: 10

John Wensley mentioned Hoskin's Research Co. (Institute, ..?),
established by some fellows from England, but operating now in the
United Sates, that sells a service to clients for improving the
effectiveness of their software people. Hoskin's approach to
marketing might provide us with guiding data; also, they might be
able to be enlisted in a productive way into a community's service
structure -- we assume that many specialized service groups will
eventually come to serve these communities.   10a

The importance of having the necessary "prospectus" ready was
generally recognized. We couldn't quite close on what that must
include; obvious that a different pitch, in different detail,
would be called for depending on whether it was for the head
software guy or the vice president who has to buy the plan.   10b

    Note: I feel intuitively that there exists a formulation for
    what we are trying to set up, and for what we are asking
    prospective clients to do, that will require a minimum of
    hard-fact substantiation. Sort of like, "there is an

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart,
Watson, Humphrey, Keirstead, Parker and Wensley

inevitable situation arising that you can't avoid; you can't
afford to ignore it; we offer such and such approach; we see no
alternative for you that comes near being as sensible and
productive..."   10b1

It was mentioned several times that a number of organizations
know that the nature of their market and their way of doing
business is unquestionably going to change radically in the next
decade or two, and that if such an organization is really facing
this challenge, it would be an especially good candidate to
approach here. For example; the automobile companies, or the
banks (moneyless society).   10c

ALso, some companies know that they are going to have periodic
times of making large changes in their information systems. These
peak times may be too rushed to allow consideraton of
new-technique development, but the company well might invest in
such development between times. Example: airline companies, and
their reservation systems; or the stock exchange.   10d

    In the latter case, it was pointed out that an organizaton
    making a heavy change may well know that it is paying five
    times what its new system might cost if they but knew better
    how to develop it, but that their business can easily absorb
    this "wastage" because of the very high value of the new ystem.
    Such an organization could invest quite a bit in exploring
    improved implementation techniques.   10d1

The heavy software costs in the stock-exchange area was mentioned
a number of times. I think John Wensley said that there was some
new approach being forced upon, or planned by, the participating
organizations, that would involve an extremely large new-software
investement. I think he also said that a number of organizations
associated with the exchange had over $10 million/year budget in
software work.   10e

It was also mentioned that some organizations could hardly take
it seriously that they were exploring an important possibility if
the exploratory budget were less than $100K/yr (maybe the figure
was higher, but the implication is that we need to gauge the
scale of activity that the key person we find within a given
organization is involved with, and propose an appropriately
significant level of activity if we want that person to be
involved).   10f

Donn Parker and Ralph Keirstead have had recent experience in
trying to describe and promote multi-party support for "software

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart,
Watson, Humphrey, Keirstead, Parker and Wensley

certification" R&D work.   Their particular contacts, and their
experiences would both be valuable here.   10g

John Wensley menioned a "programmming methodology" proposal that
he participated in developing and promoting, and that similarly
could provide us with some guidance. Apparently the promotion
stopped because SRI simply didn't have the energy to keep pursuing
it.   10h

Tom Humphrey mentioned the real value that many orgaizations
would perceive in a new method if all it did was increase the
accuracy with which they could estimate the costs of software
developments -- even if the costs weren't lowered.   10i

DCE brought out the matter of "inevitability" as one of the
factors to get across to a prospective client group. If they see
that the AKW approach is indeed inevitable, then the questions
about their participation are somewhat simplified (personal
opinion). This was discussed a bit; acknowledged to a certain
extent, but would need more dialogue within this group to settle
on a consensus.   10j

Ralph Keirstead several times mentionedthat the National Cancer
Institute seems to be both ripe and funded for some sort of
community information service.   10k

Cases of inter-industry participation were mentioned.   For
instance, in the airlines with their reservation systems. Used to
be six or so companies that cooperated in developmet of the
operating system for the computuer they all used, and each did its
own applications programming. And it was thought that there are
now a number of collaborating companies who use PARS, IBM's
Passenger Reservaton System.   10l

Richard W. Watson, James C. Norton, Harvey G. Lehtman, Kenneth E.
(Ken) Victor, Charles H. Irby, Charles F. Dornbush, David R. Brown,
Bonnar Cox, Duane L. Stone,   1a

Note on preliminary SEAS marketing meeting 29 Mar 73: Engelbart,
Watson, Humphrey, Keirstead, Parker and Wensley

Yet Another Look at the MPS Conversion

This version of the MPS paper is the (hopefully) final release of
this preliminary document. It contains only cosmetic changes
from version 2.

Yet Another Look at the MPS Conversion

INTRODUCTION   1

In the next couple of years, the system developers at ARC
would like to make the following kinds of changes and
extensions to NLS: 1a

Reimplement a mixed text and graphics capability.   1a1

Combine all of our data base management facilities into one
coherent and considerably more powerful (in fact, perhaps
external to NLS) common data base management system.   1a2

Redesign and reimplement the Journal and Ident systems to
take advantage of the new data base management capabilities
and to greatly enhance the retrieval capabilities these
systems must provide in order for there to really be a
Dialog Support System. This includes making the journal
processes considerably faster and supporting multi-site
journal and Ident systems.   1a3

Allow resonably easy, fairly efficient access to other
subsystems (perhaps on other machines in the NET) through
NLS. This must be a rather powerful linkage, since we wish
to be able to move data to the remote subsystem from NLS
files or from the user and get data back to the user or
into his files.   1a4

We want people to be able to construct specialty
functions in other programming languages which can
couple with NLS in this manner. This includes the
ability for these programs to access NLS capabilities
and to manipulate information portrayals (on display
screens, etc.) for the user.   1a4a

We should also provide facilities which can be used by
other programs in the NET to provide users with NLS
capabilities without those users having to be aware that
they are using NLS.   1a4b

Support extended character sets (Greek alphabet,
mathematical symbols, etc) in addition to a wide variety of
fonts and sub- and super-scripting.   1a5

Support multi-site NLS's: that is, a single NLS that is
running on more than one computer. For example, the
interactive command specification could be done "near" the
user and the file manipulation could be done "farther" from
him. One can imagine the use of specialty machines or

Yet Another Look at the MPS Conversion

systems for rapid text scanning or substitution, data base
management, specialized display processing, or large-scale
computation.   1a6

Support a wide variety of terminals, adapting appropriate
user interfaces for each type of terminal, without major
changes to NLS.   That is, to whatever extent possible,
provide terminal independent command language
specification.   This allows us to make new subsystems and
new commands without regard to the particular user feedback
required for each type of terminal.   1a7

Increase the execution efficiency of NLS.   1a8

Provide command language programming facilities.   1a9

Provide a file system that can accommodate a wide variety
of data, not just text and/or graphics.   We envision a
LISP-like property list associated with each node in an NLS
file, where the "property" indicates the form of its data
and specifies a set of access functions for manipulating
it.   1a10

Provide "virtual" files which the user perceives (and
manipulates) as a simple collection of information, but
may, in fact, be parts of several physical files.   We feel
that a user should be able to take alternative paths
through his information and have it presented to him in
different ways (with access and manipulation rights
dependent upon the path taken).   1a11

Provide increased user assistance features.   This can most
readily be done by having the command language described in
a data structure which assistance facilities can examine.   1a12

Provide a broad range of formatting capabilities for
display users.   This means that one should be able to see
the result of powerful formatting (such as the Output
Processor now provides) and still edit the file(s).   More
work should be done on formatters.   New ways should be
sought to describe the format (or at least certain aspects
of it) independent of the file.   1a13

In addition, we must provide a solid NLS to network users
through the NLS Utility Service.   1b

The remainder of this paper discusses the problem areas which
must be dealt with in order to proceed with the above

objectives. We include a discussion of possible alternative
development strategies and a recommendation for the approach
we should follow.   1c

THE SOFTWARE ENGINEERING CRISIS   2

Although the goal of providing good software engineering tools
sometimes conflicts with the shorter term problems of
programmers and managers, the penalties in cost and
reliability associated with non-modular software are so high
that decisions about modular programming systems and
methodologies should reflect the best available engineering
techniques.   2a

The current economics of large computer systems suggest that
software development costs exceed hardware costs, and the day
is coming when software system vendors will throw in computer
hardware as a free bonus for the purchase of a software system
(even today, one can buy in quanity a small computer on three
chips for about ten dollars). Faced with rising software
development costs and plummeting hardware costs, we must face
up to the realities of large software systems: 2b

    Machine dependence   2b1

        The expected lifetime for most software systems exceeds
        that of any piece of computer hardware, and should be
        independent of the supporting hardware processor.   2b1a

    Modularity   2b2

        The hundreds of pieces in a large software system are
        developed over a long time period. Each component must
        be produced and verified independently of other software
        components in the system. Symbols must be localizable,
        to avoid the plight of most systems in which only one
        level of external communication is supported.   2b2a

        The external interfaces for any module must be
        explicitly defined and documented. The implementation
        language should require the explicit specification of
        module interfaces to allow mechanical verification of
        module interconnections.   2b2b

        There must be reasonable facilities for keeping track of
        existing modules, their functions and interfaces, and
        the structure of systems built from them.   2b2c

Yet Another Look at the MPS Conversion

Reliability and Maintainability   2b3

> Systems which are intended to be used by people in their
> day-to-day work must, like the telephone and power
> utilities, be extremely reliable. The economic and
> psychological consequences of their being unreliable
> would be disastrous. Learning to make software more
> reliable and robust is, therefore a major concern of
> research into human augmentation.   2b3a

> In most large software systems the costs of enhancements
> made subsequent to initial implementation (usually
> referred to as program maintenance) exceed the
> development costs over the lifetime of the system. This
> is clearly true of our environment.   2b3b

> Moreover, each change makes the following one more
> difficult and the system more difficult to alter: this
> is almost certainly not completely preventable, but the
> aging of a system can probably be slowed down
> significantly by paying attention to its health
> (cleanliness of interfaces) as part of its maintenance
> and development.   2b3c

THE INDICATED SOLUTIONS   3

> The challange of producing software that satisfies the
> requirements of a constantly evolving system requires a set of
> sophisticated engineering tools. Among these are   3a

>> 1) An implementation system which supports software
>> engineering practices, including   3a1

>>> A) a high level (machine independent) implementation
>>> language.   3a1a

>>>> See Appendix C.   3a1a1

>>> B) source language debugging facilities.   3a1b

>>> C) program integration tools: dynamic loading, virtual
>>> process binding, address space management, and control
>>> of system structure and module interrelationships.   3a1c

>> 2) Design and documentation methodologies that encourage
>> modularity.   3a2

> Extensibility and modifiability are attributes that must

4

be built into the system from its inception; they cannot
be retrofitted.   3a2a

3) Software production tools that allow collaborative
development work.   These include system documentation aids
which understand programs and their interconnections, and
not just text-editing or (syntactic) information retrieval
techniques.   3a3

4) Software measurement tools that provide performance
analysis data based on measurement of the running system.   3a4

                                                                  3a5

The MPS system was conceived and is being developed to meet
some of these needs.   The underlying philosophy of the MPS
system is developed below.   See Appendix A (,0191) for a more
detailed look at specific features of the MPS system which
implement the philosophy discussed here.   3b

The MPS Software Development Approach   3c

The Modular Programming System (MPS) is a set of tools for
the development and continued evolution of large software
systems in an interactive environment.   All such large
software systems share certain characteristics: 3c1

    (a1) they are the work of a group of people whose
    membership will change over time;   3c1a

    (a2) they are necessarily constructed from a number of
    separately developed programs;   3c1b

    (a3) they evolve and grow throughout their lifetimes
    (and there is evidence that they also "age" [Lehman &
    Belady]).   3c1c

MPS aims to decrease the effort required to build and
evolve such systems and to increase the reliability of the
resultant products.   3c2

Points a1, a2, a3 are axiomatic statements about the
dynamics of all large software systems.   The following
discussion uses these and a few other axioms to establish
desirable characteristics for MPS.   Hopefully there is a
minimum of hidden meaning in the following: Each axiom and
consequence is intended to be taken strictly at face value.   3c3

Yet Another Look at the MPS Conversion

We first add two more axioms to the above set: 3c4

(a4)   Large software systems must be able to take
advantage of available hardware for efficiency.   3c4a

(a5)   Program bugs are not known before they occur.   3c4b

(a4a) a1-a4 imply that software components, hereafter
called modules, should be separately compilable and
debuggable.   Therefore there must be a way of linking or
binding separate components together to provide an
environment (data and programs) within which a module can
be debugged.   3c5

(a6)   In an interactive programming environment, users must
be able to develop and use debugging tools applicable to
programs in the same programming system.   3c6

a4a, a5, and a6 together imply that   3c7

(a6a) the environment of a program must be dynamically
alterable;   3c7a

(a6b) a program should not have to be altered when its
environment changes in ways which do not affect the
semantic intent of the program -- this is called
programming generality.   3c7b

(a3a) a3 suggests that a desirable characteristic for
tools for building large systems should be that the energy
to change part of the system should be more a function of
the complexity of the change than of the size of the
system.   This is very hard to achieve in practice, and
perhaps the best we can do is to make it a function of the
interconnectedness of the system local to the change.   3c8

(a3b) A new system always has parts which are functionally
similar to previously developed systems.   The new system
may therefore be regarded as a change (though perhaps
substantial) to an older system.   a3a then points out the
necessity for being able to reuse components which have
been made reliable through usage.   This increases the
initial reliability of the new system, decreases its cost,
and speeds up the trying of new ideas.   3c9

(a3c) One way of constructing useful components is to
build them from combinations of already existing modules
(a3b).   Hence there must be a way of bundling useful

Yet Another Look at the MPS Conversion

configurations together as seemingly atomic modules so they
can be readily reused.   3c10

The MPS approach to software engineering is sometimes
called the "supermarket" approach to software decelopment.
Most new software should be able to be fashioned from off
the shelf, documented, and proven software components. MPS
provides the implementation tools which allow the
development of a viable software supermarket.   3c11

THE PROBLEMS OF THE CURRENT NLS SYSTEM   4

NLS is a large, costly, and intricate software system. It
provides the user with powerful and sophisticated infomation
handling tools, yet as a software system it has several
problems. We have attempted to identify the general problems
of the NLS software system with the premise that it is
essential to address these problems in order to extend its
capabilities.   4a

The problems of NLS may be tracked to two general sources:
insufficiently powerful implementation facilities and design
deficiencies in portions of the system. Most of the troubles
of NLS stem from the first source, and it should be noted that
the NLS system is quite nicely designed and integrated
(compared to many large software systems).   4b

The general problems of the NLS system are: 4c

 1) NLS is difficult and expensive to maintain and modify.   4c1

    As already stated above, most of the cost of a software
    system is encountered in the maintenance and enhancement
    phases of the system which follow its initial
    development.   4c1a

    These high costs are principally a result of
    shortcomings in the software development methodologies
    and tools. More specifically we feel NLS is difficult
    to change because: 4c1b

       It has diffuse functional interfaces.   4c1b1

          The procedure/port call interface is an important
          part of the functional interfaces of NLS, but it
          is by no means the only aspect of the interface.
          The use of global shared data and the uncontrolled
          use of signals complicate the functional

interfaces.   Most parts of NLS make significant
assumptions about facilities provided by another
part of NLS. The breadth of assumptions spanning
the functional interfaces provides some measure of
the degree of interconnectedness of the system,
and it is the degree of the interconnectedness
that impacts the difficulty of changing any part
of the system. Providing clean functional
intefaces is part of the design and documentation
methodology that predicates the development of a
modifiable software system.   4c1b1a

Its communication paths are unverified.   4c1b2

Program modules establish communication paths to
program data and function facilities. The user
and provider of the data/function facilities must
agree on the reference protocol and definition of
the facility. L10 provides no capability for
verifying the correspondence between formal and
actual arguments for a function or between the
definition and useage of data structures.   4c1b2a

It is difficult to modify data representation.   4c1b3

L10 does not provide sufficient data definition
and structuring facilities. The RECORD and FIELD
facilities are useful, but are not general or
powerful enough to describe many data structures.   4c1b3a

The fact that the syntax for accessing some data
or functional facility in the L10 system is
dependent upon the type of the object (a different
notation is used for functions and arrays for
example) implies that a change in the
implementation strategy for a particular program
facility may require that all of the references be
altered as well. Finding and editing all of the
references in a large software system is
difficult, unreliable, and expensive.   4c1b3b

It is difficult to control the scope of names.   4c1b4

The scope rules are not flexible enough to support
modular programming development. It is not
possible to assure name uniqueness across
independently developed parts of the system.   4c1b4a

The command parsing for NLS is not centralized.   4c1b5

    Making significant changes to the NLS command
    language necessitates modifying many of the
    components of the system because command parsing
    is distributed too widely.   4c1b5a

    NLS has inadequate system documentation, and it is
    difficult to learn about the design and actual
    implementation of the system.   4c1b6

2) NLS is running out of address space.   4c2

Currently there are about 65 pages of address space
remaining for NLS on the PDP10. We can not continue
present cumulative development techniques much longer as
the address space problem will solidly halt development
work until solved. NLS was not designed to support an
overlay system, and the retrofit of a segmentation or
overlay system into the present NLS would be a
substantial effort.   4c2a

3) NLS is tied to processing exclusively on PDP10's.   4c3

L10 is quite machine dependent and the machine and
operating system dependencies are widely dispersed
throughtout the system making it difficult to move any
of the present NLS system to a non—PDP10 processor or
one which does not run TENEX.   4c3a

4) NLS is expensive.   4c4

The execution cost of NLS is high and on a feature by
feature basis is not competitive with other
corresponding software systems. NLS encompasses more
capabilities than any comparable software system, yet
that seems an insufficient reason to tolerate high
computer costs for NLS. One way to lower the cost of
NLS would be to build the system so that part of the
processing may be distributed over more efficient
special application computers. Global code optimization
and better structuring can improve the efficiency of
NLS.   4c4a

EVALUATION OF ALTERNATIVE DEVELOPMENT STRATEGIES   5

Given that the NLS system has a known set of deficiencies
common to most large software systems, the question is "What

development strategy is most appropriate for accomplishing the
goals of (1) significantly extending the capabilities of NLS,
(2) solving existing NLS problems, and (3) providing a solid
software foundation for NLS which will facilitate future NLS
development?"   5a

A set of five alternative development strategies are suggested
below. Each has its own merits and drawbacks. We have
highlighted the implications of each strategy and have tried
to assess the long range as well as shorter term implications
of each method.   5b

    PLAN 1 -- Status Quo approach   5b1

        The status quo approach is the continuation of present
        development strategies utilizing present development
        tools.   5b1a

            Advantages: 5b1a1

                1) System remains stable and intact.   5b1a1a

                2) No resources are "diverted" from NLS
                enhancements to the development of better software
                engineering tools.   5b1a1b

                3) Retraining of development personnel is not
                required.   5b1a1c

            Disadvantages: 5b1a2

                1) Solves none of the problems of the present NLS
                system.   5b1a2a

                2) Likelihood of significantly extending the
                capabilities of NLS is very low.   5b1a2b

            Discussion: 5b1a3

                It appears that this course of action is a
                dead-end route. The address space problem is very
                real and will soon halt NLS enhancements until it
                is solved. The cost of maintaining and
                incrementally modifying the present NLS system is
                proportional to its size, and this cost will
                continue to rise. Our development resources will
                eventually be consumed in maintenance activities,

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Yet Another Look at the MPS Conversion

> and it is doubtful if much of the planned growth
> for NLS can be accomplished using this approach.   5b1a3a

PLAN 2 -- Reimplementation of NLS using existing L10
system.   5b2

> This strategy proposes that major portions of NLS be
> redesigned and reimplemented to improve and enhance NLS
> and provide a beter foundation for future development
> work.   5b2a

> Advantages: 5b2a1

>> 1) Some of the present NLS problems can be solved: 5b2a1a

>>> an overlay mechanism can be built to solve the
>>> address problem   5b2a1a1

>>> the command parsing can be centralized   5b2a1a2

>>> the system may be redesigned so it can be
>>> distributed over several PDP10s   5b2a1a3

>>> the system can be made more efficient   5b2a1a4

>>> the functional interfaces may be cleaned up   5b2a1a5

> Disadvantages: 5b2a2

>> 1) Doesn't solve some of the most critical
>> problems: 5b2a2a

>>> verification of communication paths   5b2a2a1

>>> modifiability of data representations   5b2a2a2

>>> control of scope of names   5b2a2a3

>>> machine dependence   5b2a2a4

>> 2) High cost (relative to payoff)   5b2a2b

> Discussion: 5b2a3

>> The redesign and reimplementation of NLS using
>> present development tools can obviously solve only
>> those problems which are related to design or
>> implementation inadequacies of the current

implementation. Unfortunately, some of the most
costly problems of NLS are related to our current
development tools and methodology, and a change in
this area is indicated if we hope to be able to
address these problems.   5b2a3a

PLAN 3 -- Improve L10 development system, then reimplement
NLS   5b3

This development plan calls for the improvement of the
L10 implementation tools followed by the redesign and
reimplementation of NLS using the improved system.   5b3a

Many of the deficiencies of the NLS system as enumerated
previously may be directly related to deficiencies in
the L10 implementation system. Specifically, we have
identified eight shortcomings of the L10 system that
have direct impact on the current software problems of
NLS.   5b3b

Some problems of the current L10 system: 5b3c

    1) Inadequate data definition facilities   5b3c1

    2) Uncontrolled and unverified procedure interfaces   5b3c2

    3) Minimal type checking performed by the compiler   5b3c3

    4) Lack of a consistent reference notation   5b3c4

    5) Inadequate control over the scope of names and
    definitions   5b3c5

    6) Insufficiently optimized code   5b3c6

    7) Machine dependence   5b3c7

    8) Complete data/procedure definitions not available
    at compile time   5b3c8

In asserting that the L10 system can be changed, we
should identify exactly what changes are contemplated
and how they may possibly be accomplished.   5b3d

Plan 3A -- First extension to current L10 system   5b3e

    Items 1-5 listed above are principal contributors to
    the difficulty of change problems of NLS. If we

expect to meaningfully impact the modifiability
characteristics of NLS, then it is essential that
this set of L10 problems be addressed.   5b3e1

Let's consider then that this constitutes the minimum
set of L10 enhancements which are essential for
providing better development tools.   5b3e2

    Advantages: 5b3e2a

        1) Provides a software implementation system
        for the production of more modifiable software.
                                                          5b3e2a1

        2) Cleans up most of the major problems of NLS.

                                                          5b3e2a2
    Disadvantages: 5b3e2b

        1) The level of effort required to implement
        these changes to L10 is large and may easily
        exceed that effort required to complete the MPS
        system.   5b3e2b1

        2) Requires a transliteration of NLS, that is
        the changed L10 could not directly compile
        existing L10 code.   5b3e2b2

Plan 3B -- Second extension of L10 system   5b3f

Plan 3B is to extend L10's scope of names rules to a
general name space system incorporating the INCLUDE
definition facilities of MPS.   5b3f1

    Advantages: 5b3f1a

        1) Solves the restricted name space problem.   5b3f1a1

        2) Fairly inexpensive to implement.   5b3f1a2

    Disadvantages: 5b3f1b

        1) Doesn't impact most of the problems.   5b3f1b1

        2) Requires a restructuring of NLS.   5b3f1b2

        3) Requires a new loader and probably new
        debugging tools.   5b3f1b3

Plan 3C -- Third extension of L10 system.   5b3g

Yet Another Look at the MPS Conversion

Plan 3C calls for turning L10 into a globally
optimizing compiler in order to increase the
execution efficiency of NLS.   5b3g1

    Advantages: 5b3g1a

      1) Gain in efficiency.   5b3g1a1

    Disadvantages: 5b3g1b

      1) Difficult to implement in tree-meta L10.   5b3g1b1

General discussion: 5b3h

The MPS system was designed and is being developed to
solve the problems of the L10 implementation system.
The decision was made some time ago do develop MPS
independently of the L10 system. Plan 3 is a
rejection of this idea and a proposal to enhance L10
until it approaches the capability of MPS.
Theoretically, it is possible to accompilsh this, but
the amount of effort required to significantly extend
L10 is greater than the effort required to develop
MPS.   5b3h1

It appears that there are no significant advantages
and several disadvantages to this development
strategy.   5b3h2

PLAN 4 -- Incremental conversion of NLS to MPS   5b4

It is technically possible (albeit not efficient) to
coerce the MPS system to communicate existing L10
programs. It is therefore technically possible to
utilize portions of the present L10 system in a hybred
MPS-L10 environment.   5b4a

Advantages: 5b4b

1) Permits some conversion to be distributed over
time.   5b4b1

2) User programs may not require conversion.   5b4b2

3) Some feedback is obtained on the relative merits
of the MPS system.   5b4b3

Disadvantages: 5b4c

Yet Another Look at the MPS Conversion

1) The new NLS my be unstable because the interfaces
between MPS and L10 sections can not be verified and
controlled.   5b4c1

2) Restricts the redesign of NLS to compatability
with the present implementation for those portions of
the current system which would be candidates for
incorporation in the hybred system.   5b4c2

3) Requires most of NLS to be converted before it can
be run under MPS.   5b4c3

    Discussion: 5b4d

    The drawbacks of system instability and redesign
    constraints make this alternative quite unattractive.
    Elegance in software engineering is more than just a
    pretty word. Every ad hoc or "kludged" interface in
    a software system is a crack in its foundation; an
    ediface as large and interface replete as NLS can
    tolerate very few cracks.   5b4d1

PLAN 5 -- Reimplementation of NLS using MPS system   5b5

This strategy calls for the redesign of NLS to take
advantage of the features of the MPS system and
simultaneously extend the capabilities of NLS. The
redesigned NLS would then be implemented completely in
MPS.   5b5a

    Advantages: 5b5b

    1) Potentially solves all of the existing NLS
    problems (assuming a domumentation methodology is
    developed and utilized for the design and
    implementation).   5b5b1

    2) Provides an NLS system with significantly improved
    capabilities.   5b5b2

    3) Provides a solid NLS system and software
    implementation facilities that will permit future
    research and development work at minimum cost.   5b5b3

    Disadvantages: 5b5c

    1) High initial cost.   5b5c1

2) May have to debug MPS facilities while developing
new NLS system.   5b5c2

   Discussion: 5b5d

This strategy has the highest potential payoffs of
any of the proposed plans but it also has some risks.
It appears that simple economics will eventually
demand the adoption of this plan. See Appendix A (
,0191) for a further discussion of this plan.   5b5d1

CONCLUSION   6

Within any of the suggested development plans, two approaches
can be taken: 6a

1) as much of the development staff as is possible could be
diverted to solve the existing problems and provide a basis
for future growth (resulting in a period during which no
new user features or improvements are observed), and   6a1

2) a small group could take a copy of the system and make
the intended modifications, leaving the rest of the staff
free to add features within the constraints of the
aforementioned problems.   6a2

The NMDT currently favors this second approach.   6b

The above analysis indicates the following course of action.
The NMDT should begin the redesign work for NLS in the MPS
environment. They should draw on the support of the rest of
the group as needed and should endeavor to keep the rest of
the group abreast of their progress. This leaves the rest of
the development staff free to continue enhancing the existing
system. At some point in the future we will have two systems,
one in MPS (NLS/MPS) and one in L10 (NLS/L10) with additional
features. At this point an intensive training effort should
begin so that the whole staff can bend itself toward moving
the enhancements in NLS/L10 to NLS/MPS in a way that is
consistent with its design philosophy and implementation
conventions. This should result in maximal gain in user
facilities at minimal long term cost.   6c

Appendix A -- a closer look at Plan 5   7

   Software Engineering Capabilities of MPS   7a

Almost all of the "new" MPS facilities can be attibuted to

the observed deficiencies of L10 and other available
implementation systems. To some extent we can identify
specific features of MPS which are designed to allay
current implementation system problems. To satisfy
software engineering objectives, MPS has concentrated on
providing the following capabilities: 7a1

1) Controlling access to facilities   7a1a

(helps improve the modularity and maintainability of MPS
code)   7a1b

    control mechanisms which enable modules to be linked
    together with a minimum of builtin assumptions about
    how each module interprets control transfer over the
    link between them.   7a1b1

        Simple function call and return mechanisms alone
        do not satisfy this requirement since they already
        impose assumptions about how each module is being
        used; i.e., each one is either a caller or a
        callee.   7a1b1a

    full data typing facilities that do not permit
    arbitrary references to facilities.   7a1b2

        MPS will check consistency between declaration and
        usage of data and will check consistency of module
        interconnection, and will indicate to programmers
        that re-compilation of a module m, also requires
        recompilation of modules k,l, and n -- and in fact
        will not allow these module to execute until they
        have been recompiled.   7a1b2a

            MPS can also supply static information about
            module interdependency.   7a1b2a1

            These facilities can be used to supply
            information about the cost of an anticipated
            modification to a module in terms of required
            recompilations of modules which include it.   7a1b2a2

            Further MPS development should provide the
            ability for one or more modules to be
            interpreted while the rest are compiled. This
            allows programmers great flexibility during
            software development and debugging, and should
            provide for easily written (albeit less than

optimally efficient) programs to perform tasks
which do not warrent large development cost
(similar in nature to the current Content
Analysis filters).   7a1b2a3

2) Providing better definition facilities   7a1c

(helps inprove the efficiency and maintainablity of MPS
code)   7a1d

Data definition facilities that   7a1d1

clarify the specification of the data structures
which, together with control, completely specify
the interfaces between modules;   7a1d1a

are potentially economical in space and accessing
speed without being dependent on a particular
machine;   7a1d1b

are an aid in developing and describing program
components and the structure of algorithms.   7a1d1c

Include facility of MPS allows modules to share data
definitions and allows programmers to control what is
or is not shared.   7a1d2

More powerful control over the scope of symbols.   7a1d3

Virtual external references provide flexibility.
Modules communicate via ports and may connect any
other module to the port, provided the interface
requirements are met, or may replace any module by
another that satisfies the interface requirements   7a1d4

3) Providing better binding and configuration facilities   7a1e

(aids collaborative development and decreases need for
reprogramming)   7a1f

Facilities for dynamically binding the virtual
objects required by a module for execution to real
objects: 7a1f1

e.g., for binding a procedure call to a real
procedure, a "typed" pointer to a data structure
of the correct type, etc. The set of bindings for

a module's virtual objects at a given moment
comprises the environment for that module.   7a1f1a

Ability to dynamically reconfigure the system allows
for insertion of test or debugging modules and
replacement of modules for testing updates or new
configurations.   7a1f2

Complete accessibility to the MPS "virtual machine"
(which is a set of primitive MPS programs) and to MPS
programs as data structures.   7a1f3

This enables debugging and measuring tools to be
built as standard MPS programs and along with
dynamic binding allows such tools to be brought to
bear on MPS programs whenever necessary.   7a1f3a

The ability to bundle a configuration of data and
program modules together as a module which may be
saved for later use just as a simple, atomic module: 7a1f4

this allows systems to be initialized, partially
executed and then bundled up for later use with
the overhead of the initial computations factored
out;   7a1f4a

it also allows a configuration which has exhibited
a bug to be saved away for later perusal with its
state as it was when the bug was discovered;   7a1f4b

lastly, it allows useful modules to be constructed
by configuring them from other, existing modules.
This is in the spirit of using already available
components whenever possible and provides some
logical completeness to the system.   7a1f4c

    4) Solving current address space constraints   7a1g

Segmention (automatic overlay) system will help us
out of our current upper bound problem and will make
better use of available memory space.   7a1g1

Previous work in this area   7a2

The modularity/process/port/virtuality ideas have been
successfully used by Rudy Krutar in several systems
including an interactive extendible language system.   7a2a

A number of fairly complex, large programs have been
implemented and are running in MPS;   these include the
MPS compiler itself, loading and binding facilities, and
the MPS debugging and measurement packages.   7a2b

Advantages of implementing NLS in MPS   . 7b

  What we are looking for from MPS and the conversion   7b1

    Reliability   7b1a

      simpler relationships and dependencies   7b1a1

        with aids for the programmer to keep track of
        these   7b1a1a

      better definitions of interfaces   7b1a2

      ability to put a module into a test-environment for
      testing   7b1a3

      Mechanical interconnection verification.   7b1a4

    Efficiency   7b1b

      The system should gain significantly in terms of
      efficiency because of better global optimization
      (more efficient overall organization)
**7b1b1

      Fully typed data structures and restricted control
      flow allow compiler to produce more efficient code.   7b1b2

      Several basic mechanisms are faster in MPS than in
      L10   7b1b3

      Co-routine linkage can save setup time for frequently
      used routines and may help in overall design.   7b1b4

      better control facilities, especially SIGNAL's   7b1b5

      Ability to redefine procedures should clean up many
      procedure interfaces and will reduce the number of
      procedures.   7b1b6

      Since the compiler is heavily used by system
      programmers, it behooves us to have it be efficient
      as well as to have it produce efficient code for the
      programs which it compiles. Since the MPS compiler

is written in itself, all optimization improvements
made in the compiler can be brought to bear on the
compiler itself.   7b1b7

Ability to interface special purpose "subsystems" to NLS   7b1c

may interface modules responsible for NLS file
handling, display generation, etc. to new modules to
make special subsystems of NLS   7b1c1

Transportability   7b1d

language for MPS and the system primitives should be
relatively easy to move to other machines and
operating systems.   7b1d1

very few primitives written for the base machine   7b1d2

All of MPS written as modules by bootstrapping   7b1d3

    Compiler completely writtten in MPS   7b1d3a

Compiler implemented so that machine dependence is
restricted to only a few modules.   7b1d4

Ability to access remote systems   7b1e

New design plus MPS dynamic reconfiguration of
modules allows for more reasonable linkage of NLS to
other subsystems and the distribution of NLS
processing over more than one machine.   7b1e1

    can build module which will run with NLS and drive
    another system over the ARPANET   7b1e1a

    may interact with NLS user, format request, send
    over ARPANET, get response, format for insertion
    into NLS file or for NLS display   7b1e1b

well defined interfaces, dynamic loading, and
modularity also make it possible for other groups to
build modules to run with NLS   7b1e2

COSTS OF IMPLEMENTING NLS IN MPS   7c

The cost of the conversion to MPS has at least three
different aspects.   7c1

Yet Another Look at the MPS Conversion

The actual implementation cost (the manpower and
computer resources).   7c1a

The diversion of development resources for the
implementation period.   7c1b

A transition period of instability.   7c1c

Detailed implementation estimates will be issued
periodically during the design phase for the NLS
conversion.   7c2

Appendix B -- Conversion plan   8

The conversion plan will be forthcoming, pending adoption of
some development strategy.   8a

Appendix C -- Our requirements in terms of an implementation
language   9

A general data definition capability   9a

Adaquate data types   9a1

clarity of expression, consistency checks   9a1a

Flexibility of data structuring   9a2

one is strongly influenced by the data structures
available in a language.   9a2a

General block structuring with scope of names   9b

Descendent blocks   9b1

A generalized reference notation   9c

Array referrences   9c1

Function referencees   9c2

Pointer qualification   9c3

Name qualification   9c4

Macro syntax   9c5

Explicit definition of module interfaces   9d

Yet Another Look at the MPS Conversion

Required declaration of all external data and procedures   9d1

   Declaration of formal arguments   9d1a

     Type   9d1a1

     Number (optionality)   9d1a2

       an economical way to call a routine with a
       variable number of arguments   9d1a2a

     Access permitted   9d1a3

       read only, read and write (this is in addition to
       the _ and = initialization capability in MPS)   9d1a3a

   Declaration of external data   9d1b

     Type   9d1b1

     Access permitted   9d1b2

       read only, read and write (this is in addition to
       the _ and = initialization capability in MPS)   9d1b2a

       In addition, a facility for designating that some
       routines and data structures in the outer most
       block are not to be INCLUDED by another module.   9d1b2b

Simple and consistent syntax   9e

  Consistent expression syntax   9e1

    Infix operator notation for common operators   9e1a

    Prefix (functional) notation for all other operators   9e1b

      Equivalent to built in functions -- must have the
      same syntax as a function reference   9e1b1

    Mixed mode expressions not allowed   9e1c

      Coercions must be explictly requested.   9e1c1

      Built in functions provide for conversion of data
      types   9e1c2

Powerful and useful control statements   9f

Yet Another Look at the MPS Conversion

Goto's should be superfluous   9f1

   A program is more easily understood if it does not have
random Goto statements in it.   9f1a

   Compiler can do much better optimization if goto's are
controlled.   9f1b

Procedure variables   9f2

Storage management facilities   9g

  Choice of storage class   9g1

    AUTOMATIC (LOCAL)   9g1a

    STATIC   9g1b

    BASED   9g1c

     programmer controled run-time allocation and release
of storage.   9g1c1

     optional selection of allocation region (ZONE or
AREA)   9g1c2

     optional selection of storage management strategy   9g1c3

  Control of scope of data names   9g2

    INTERNAL - available only to inclusive extent of
defining block   9g2a

    EXTERNAL - (common blocks, Included data structures)   9g2b

Access to machine dependent features   9h

Restricted   9h1

Machine dependencies must be declared   9h2

Yet Another Look at the MPS Conversion

(J15376)   29-MAR-73 17:22;   Title: Author(s): Irby, Charles H. ,
Dornbush, Charles F. , Mitchell, James G. /NMDT ; Distribution: /NMRT
EMC ; Sub-Collections: NMDT NMRT EMC; Clerk: CFD ;

15376 Distribution

Paxton, William H. , Deutsch, L. Peter , Wallace, Donald C. (Smokey) , Satterthwaite, Ed H. , Bass, Walt , Andrews, Don I. , Engelbart, Douglas C. , Watson, Richard W. , Norton, James C. ,

Outline of purpose and need relative to SEAS marketing help from SRI people

Handout to Tom Humphrey, Ralph Keirstead, Donn Parker and John Wensley at meeting 29 Mar 73; see (15375,)

Outline of purpose and need relative to SEAS marketing help from
SRI people

Our basic "Community Plan":   1

    Want to enlist subscribers to what we call our
    "Knowledge-Workshop Utility Service."   1a

    Subscribers will be using this service as an effective means
    for their becoming ready to evolve through their own stages of
    Knowledge-Workshop application. We assume that they accept
    the following: 1b

        It is inevitable that close, integrated application of
        communication and computer technology come into their
        knowledge-work lives as constant, minute-after-minute,
        hour-after-hour part of the way they work. Inevitable;
        only a matter of time; but when, and by what stages of
        evolution, for their organization?   1b1

        The applications will be very pervasive, and will extend
        down to fine-detail operations within almost any
        knowledge-work category.   1b2

            The pervasiveness and detail also involve "coherence"
            of function, working procedures and conventions, skills,
            concepts, terminology, etc. among the new tools; it will
            all represent a workshop comprising a great many tools
            serving a large number of operations.   1b2a

        The organizational structure, the nature of people's roles
        within those structures, the nature of their working
        methods, will all be afftected -- in the end, with very
        significant chage from today, but necessarily by stepwise
        evolution that accommodates the necessary gradual
        character of what is required in the shift in attitude,
        understanding, belief, skills, etc. among the people in the
        organization.   1b3

Initial "planning algorithms" that we are following: 2

    Select a limited number of communities and explore their
    potential;   2a

        whether to launch a number of them simultaneously and let
        them grwow in number and level of activity in some
        "natural" way, or to concentrate on few enough that we can
        build their level of membership and activity quickly to
        some critical mass.   2a1

Outline of purpose and need relative to SEAS marketing help from SRI people

Initially, we have starts and leads in the following: 2b

   Discipline-oriented communities already building up: 2b1

      Speech Understanding Research Program an IPT-sponsored,
      multi-project program, where coordination amog a number
      of research groups is part of the plan. Most of the
      contractors are on the ARPANET already.   2b1a

      Packet-Communication Project -- IPT, also distributed.   2b1b

   Office "automation":   2b2

      RADC already two years into this; gearing up now to
      support a 40-person group; getting all support over the
      ARPANET; buying $200K of our NLS Utility for the first
      year.   2b2a

      ARPA, three of it's "home" offices are interested.   IPT
      definitely planning to use NLS Utility. Nuclear
      Monitoring beginning to expriment wih NLS; plannin an
      initial expriment with front-end to a data base on
      energy; uite probable that they will begin automating
      their office work. Human Resources Research planning a
      communit of research groups and military training
      centers tied via ARPANET in support of Compute Based
      Instruction activity; this Community eing planned for
      support of the Community Workshop type; also considering
      internal automation of their home office.   2b2b

      Bell of Canada is seriously considering buying NLS
      Utility, to begin internal-usage experimenation;
      initially as office support, bu potentially to support
      distributed collaboration and information services.   2b2c

   Special-emphasis being considered on these
   discipline-oriented communities: 2b3

      Energy: Very importat area; already a start via ARPA's
      NMRO interest in NLS and involvement in energy; had
      already been an area that SRI selected to concentrate on
      as a top-level "program" area; SRI already has very good
      start in its activity and connections; ARC has very good
      base of acquaintanceship via Watson, Kudlick, and Rech
      who come from Shell -- and in particular, Rech's OR
      involvement with top-level planning and analysis there.   2b3a

Outline of purpose and need relative to SEAS marketing help from
SRI people

        Publication systems: SRI already has involvement and
interest ina number of levels and ways, with many
contacts. As an area of potential value to all other
Workshop applications, it is very important to have
accelerated interest and devlopment.   2b3b

        Computer-systems developers: From the beginning of
augmentation activity at SRI, this area held as being of
prime value for early aplication concentration. Section
Iv-C (pp. 116-118) of the 1962 OSR report lists nine
valid considerations for software engineers being
high-value candidates here; and the immense
burden/bottleneck now resting on the software side of
application-system evolution adds considerable economic
validation.   2b3c

  Special notes about the computer-systems development area: 2b4

    We have a nucleus activity within ARC called SEAS (for
Software Enineering Augmentation System). Our own
software development makes use a fairly advanced set of
tools, conventions, etc. Our SEAS activity is
coordinating the evolution of our own Software Workshop;
but also is preparing the way for use of our basic
Wworkshop acility for programming in other languages,
for other types of applications.   2b4a

    Currently we want to study the outside world of system
development (including operations, maintenance, user
documntation and training, etc.), to determine what sort
of organizations, computer applications groups, initial
"pitch", etc. to concentrate on towards building up a
community of groups who have a serious interest (backed
by investment of resources) in improving the
effectiveness of software engineers.   2b4b

Our current service plan   3

  Arrange for contracted computer-support service to be made
available "fob Cupaertino".   3a

    Help arrange communication with the Cupertino Utility
facility -- ARPANET, TYMNET, Private Wire   3a1

    Help specify appropriate configuration of local terminals
by which subscriber can make use of the NLS Utility
services   3a2

Outline of purpose and need relative to SEAS marketing help from
SRI people

    Provide basic training to a limited number of (selected)
people from the subscriber group.   3b

    Provide continuing close support to the "architect" of the
subscriber group -- a person, not in ARC, who preferably will
be a member of the subscribber group, and who will have
reasonable period of tenure at this role (and reasonable
interest in and allegiance to it).   3c

    Provide documentation for various purposes: initial learning,
general user reference, special user reference, architect
guides to analysis, operations designa, training, application
programming, etc.   3d

Our current need   4

    Leads to the organizations, and to specific people within
them, who are reasonably likely prospects.   4a

    Help with the initial contacts -- help in finding the right
guy and in getting him to come look/listen.   4b

    Some possibility that if any particular application-type
community was of special interest to one of our SRI
people/groups, that he/they could work toward developing the
community, and toward developing for himself/itself the role
of architect.   4c

15377 Distribution
   Watson, Richard W. , Norton, James C. , Lehtman, Harvey G. , Victor,
   Kenneth E. (Ken) , Irby, Charles H. , Brown, David R. , Cox, Bonnar ,
   Stone, Duane L. ,

Outline of purpose and need relative to SEAS marketing help from
SRI people

(J15377) 29-MAR-73 16:55;   Title: Author(s): Engelbart, Douglas C.
/DCE ; Distribution: /rww   jcn   hgl   kev   chi   drb   bc   dls   ;
Sub-Collections: SRI-ARC; Clerk: DCE   ;

TRACE and UNTRACE documentation:

Documentation of the NLS tracing technique presented 3/28/73 can
be found in (user-progs,trace,1). This includes detials about
how to use UNTRACE, in case you forgot what some of the printout
means.   1

15378 Distribution

Victor, Kenneth E. (Ken) , White, James E. (Jim) , Dornbush, Charles
F. , Michael, Elizabeth K. , Vallee, Jacques F. , Mitchell, James G.
, Deutsch, L. Peter , Kaye, Diane S. , Andrews, Don I. , Bass, Walt ,
Hopper, J. D. , Irby, Charles H. , Lehtman, Harvey G. , Wallace,
Donald C. (Smokey) , Victor, Kenneth E. (Ken) , Deutsch, L. Peter ,

TRACE and UNTRACE documentation:

(J15378)   29-MAR-73 12:36;   Title: Author(s): Andrews, Don I. /DIA;
Distribution: /NPG DCW KEV LPD; Sub-Collections: SRI-ARC NPG; Clerk:
DIA;

Prospects for Boston TNLS Course

I certainly expect to be there if there is TNLS class in Boston
and will be glad to collect on meals. There has not been much
response to the RFC yet. Any thoughts on whether your part o BBN
would want to be host?   1

On Blind Light I have gone back to the beginning and am producing
a new draft, final in the sense I will offer it to publishers,
being written from beginning to end (up to now it has been writen
a bit her and a bit there). I started over with the part you
have at the beginning and am up to about 110 ages in the
revision. W, long suffering like most writers wives, is retyping,
and is up to about 25...i.e. not past anything yo haen't read.   2

The character that is most me is Pentheus.   3

15379 Distribution
   Neigus, Nancy J. ,

Prospects for Boston TNLS Course

(J15379) 29-MAR-73 10:21; Title: Author(s): Van Nouhuys, Dirk H.
/DVN; Distribution: /NJN; Sub-Collections: SRI-ARC; Clerk: DVN;

Suggestion for adjusting NLS help to expertise level.

Assigning NLS users an "Expert rating" and level-clipping a Help
file as a function of that rating may be a way to solve our
expert/novice problem.

Suggestion for adjusting NLS help to expertise level.

Several questions consistently come up in discussions of the
novice/expert mode.   1

One frustrating problem is giving NLS the ability to recognize
who is an expert and who is not. This is not trivial because a
given user may be an expert in some areas of the system and a
novice in others.   2

To solve this problem a possible approach would be the
introduction of a technique I have recently seen used in other
systems, namely the assigning to the user of an "expert rating"
that varied with the type and number of mistakes he made in the
course of a session.   3

    In the case of NLS such a rating could be based on the number
    of "illegal" operations requested, the number of ENDCASES
    encountered in command parsing, and the error messages
    triggered.   3a

When the user requested Help by typing "question mark" he would
then be given a volume of information dependent on two variables,
namely 1) The path through which he had reached this particular
point and 2) The current value of his expert rating.   4

One possible way to implement this recommendation would be to
provide a judiciously organized help file (possibly the user
guide itself) driven by a Help module performing level-clipping.
The branch displayed would be constructed from the current state
of the command stack, and the number of levels seen in that
branch would be determined by the expert rating.   5

Suggestion for adjusting NLS help to expertise level.

(J15380) 29-MAR-73 11:30;   Title: Author(s): Vallee, Jacques F. /JFV;
Sub-Collections: SRI-ARC; Clerk: JFV;
Origin: <VALLEE>NOVICE.NLS;1, 29-MAR-73 11:22 JFV ;

COMMENT ON: (FEB73,7c) More Blap and garbage by Kirk Kelley

This is a test comment to see what happens.

COMMENT ON: (FEB73,7c)   More Blap and garbage by Kirk Kelley

This is a sample Plex to see how Deans place COMMENT link works.   1

It has three statemnts so that it will not tag along with the
journal link to be in the file.   2

This is all a bunch of bullshit.   3

15381 Distribution
    Cmmtfile, Cmmt , Fikes, Richard E. ,

COMMENT ON: (FEB73,7c)   More Blap and garbage by Kirk Kelley

(J15381)   29-MAR-73 14:38;   Title: Author(s): Kelley, Kirk E. /KIRK   ;
Distribution: /COMMENT   ; Sub-Collections: SRI-ARC COMMENT; Clerk: KIRK
;

COMMENT ON: (FEB73,7b)   More Blap and garbage by Kirk Kelley

This was sent to CMMT and not COMMENT.

COMMENT ON: (FEB73,7b)   More Blap and garbage by Kirk Kelley

This is a sample Plex 2 to see how Deans place COMMENT link
works.   1

It has three statemnts so that it will not tag along with the
journal link to be in the file.   2

This is all a bunch of bullshit.   3

15382 Distribution
   Cmmtfile, Cmmt , Fikes, Richard E. ,

1

COMMENT ON: (FEB73,7b)   More Blap and garbage by Kirk Kelley

(J15382)   29-MAR-73 14:40;   Title: Author(s): Kelley, Kirk E. /KIRK ;
Distribution: /COMMENT ; Sub-Collections: SRI-ARC COMMENT; Clerk: KIRK
;