Daughtry directory/initials file

Jim thanks for your excellent help in restoring the initials file to
my directory. Today the journal system seems to be working perfectly
foe me ... I've finally gotten some mail   Feel free to comunicate
with me. It would be nice if you could send the Data Query manual
back to me . For some reason the facility people are stingy with
reference material.. as if thats all there is to woory about   Even
if the manual costs less than five dollars.   dave daughtry.   1

Daughtry directory/initials file

(J20733)   6-DEC-73 07:29;   Title: Author(s): David L. Daughtry/DLD2;
Distribution: /JHB DLS DLD2; Sub-Collections: NIC; Clerk: DLD2;

ISI Integrated Data Base Updates

6 december 1973   1

At the present time there exist an interim procedure for updating the
ISI integrated data base. Donna Robilotta is the focal point for all
updates for the data base. She has been given several documents that
include instructions for handling updates, report generation etc.
Copies of these documents were given to Panara, Cavano, Bucceiro, and
Van Alstine.   2

Donna's efforts to continously keep the data base updated will
require interaction with the ISI administration office (Bucceiro) and
ISI engineers as well. Hopefully, we all can be cooperative. I
expect that many inputs will be made, or, many data elements will be
reviewed on a monthly basis and perhaps more often when required.   3

During the past year there were no inputs from the admin office (ISI)
for PRR's and Contracts; therefore, the data base is sorely outdated
in this area. Attempts are being made to add all new PR's and
contracts that were generated within ISI. This leads to an important
requirement. Buccerio MUST report all new PR and contracts for ISI
beginning NOW so that the data can be continously recorded. That is,
the PR and contract is to be added at the time a respective number is
assigned regardless of what ever data is available at the time.
Modificatons would be made later. Additionally, the funding changes
related to PR's and contracts must be immediately reported to Donna
so that updates can be made. The process is easy and once initiated
will not involve great effort by many people.   4

If there are any questions or dissatisfactions please contact DAve
DAughtry at x2672 or intercom #7. Thanks.   5

DAVID DAUGHTRY   6

ISI Integrated Data Base Updates

(J20734) 6-DEC-73 08:03; Title: Author(s): David L. Daughtry/DLD2;
Distribution: /FJT DVA DRR2 RBP TJB2 JPC; Sub-Collections: NIC; Clerk:
DLD2;
Origin: <DAUGHTRY>ISMIS-LETTER.NLS;1, 6-DEC-73 07:58 DLD2 ;

NLS frontends -- Thanks

I had thought that a June-July delivery of hardware for an ARC
production system would be plenty soon enough and would give us a
chance to do some expeiments and perhaps a first stab at a CML
interpreter for an 11, so that we know what the hell to order. Also,
a delay here will give us more time to evaluate the tasker
replacement situation.

NLS frontends -- Thanks

Dick, thanks for the decisive action on NLS frontend stuff. --
Charles.

1

NLS frontends -- Thanks

(J20735) 6-DEC-73 08:46;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /RWW DCE JCN; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to 20439: NIC: Goals, Problems, Requirements

Mike, I just wanted to tell you that I thought the paper on NIC goal, problems and requirements was extremely well written and that I concur with your analysis. -- Charles.

1

Response to 20439: NIC: Goals, Problems, Requirements

(J20736)   6-DEC-73 08:54;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to JI's 20027 and NDM's 20417: Output NLS command

The program used in conjunction with the insert sequential would, of course, take care of printer control characters and proper page layout. I do not claim this is trivial but it is doable.

Response to JI's 20027 and NDM's 20417: Output NLS command

Gentlemen, with respect to the notion of creating a file which can be viewed on-line through NLS which appears as though the output processor directives were in effect, why not simply produce a sequential printer/tty file (using the OP) and then do an Insert Sequential to get it into NLS?? I know this is an obvious question, but I think the REAL solution to the problem you raise should be sought and any interim solutions should come at a cost comensurate to their payoff. The ability to see it in NLS form and not be able to edit it in its formated form is worthwile but only insofar as it will save the user paper and printing time.   1

Response to JI's 20027 and NDM's 20417: Output NLS command

(J20737)   6-DEC-73 09:05;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /NDM JI; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to 20452:uppercase viewspecs from mouse/keyset

Kirk, I think your suggestion about mouse buttons/upper case
viewspecs is very good. We will try to change it so that xx0 is
lowercase viewspecs and xxx is upper case viewspecs, with 0xx being
control shift. -- Charles.   1

Response to 20452:uppercase viewspecs from mouse/keyset

(J20738)   6-DEC-73 09:11;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /KEV KIRK; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to 20449: NLS connect to directory command

Ken, I think Kirk is right in (20449,) with respect to the NLS
directory command. It will require using READCA( ).   1

Response to 20449: NLS connect to directory command

(J20739) 6-DEC-73 09:15;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /KEV KIRK; Sub-Collections: SRI-ARC; Clerk: CHI;

Robert, Thanks for the suggestions on margin notes and remarks. We
have been thinking along a slightly different line which will yield
the same results but it wont happen tomorrow. We will consider your
idea and its impact on our previous plans. -- Charles Irby   1

Response to 20258 and 19557

(J20740)   6-DEC-73 09:18;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /RLL; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to 20240: Statement name referencing

Robert, the construct *NAME will move you to the next occurence of a statement by the name NAME. To get to the first occurence simply type .0 *NAME. The construct NAME (without the *) moves you to a statement by that name, regardless of the file structure. This latter form is about 10 times as fast as the *NAME form but should really not be used if there is more than one occurence of NAME in the file, since you do not know which you will find. The exception to this rule is right after an OUTPUT FILE. In this case the file is ordered internally so that NAME is the same as .0 *NAME. -- Charles.   1

Response to 20240: Statement name referencing

(J20741)   6-DEC-73 09:25;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /RLL; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to 20154: Command frequency study

Susan, nice work on the command frequency study. I really feel that
if you had some better tools (which we should be able to build in the
new command interpreter) you could really get a good handle on the
system usage. Lets talk about it some time. -- Charles.   1

Response to 20154: Command frequency study

(J20742) 6-DEC-73 09:28; Title: Author(s): Charles H. Irby/CHI; Distribution: /SRL; Sub-Collections: SRI-ARC; Clerk: CHI;

INTERROGATE

Ken, why is the form of the INTERROGATE command not consistent with
the rest of the EXEC commands???????? What the hell is going on?
-- Charles.

1

INTERROGATE

(J20743)   6-DEC-73 09:32;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /KEV DCW WRF; Sub-Collections: SRI-ARC; Clerk: CHI;

Response to RWW's 20134:NLS on all TENEX's

Dick, I could not agree more with your views on getting nls
(including DNLS) onto all TENEX systems in the ARPANET. In fact, if
this NLS frontend-mini stuff works out well, I will be pushing to get
the backend implemented on other than TENEX systems [I think we could
do a 360/370 backend, for example). -- Charles.   1

Response to RWW's 20134:NLS on all TENEX's

(J20744)   6-DEC-73 09:40;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: CHI;

Re 20115: Connect to host and insertion of status messages

Ken, with respect to the connect to host idea, I think in the long
run one will not want to bother with different
accounts/names/passwords on all of the systems he uses. Why don't we
try to force this by try his current login-name/account/password for
the remote host and give hime a command (as you suggest) to override
this. I think the biggest problem will be the account number, since
some have different forms.

With respect to the show commands allowing an insert at the end, We
will have to think about how we could implement that. We also need
to make it very clean from the user's viewpoint. After thinking
about it for a while, I think it is a case of killing an ant with an
h-bomb, but I am still willing to consider it.   1

Re 20115: Connect to host and insertion of status messages

(J20745)   6-DEC-73 09:49;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /KEV RWW(fyi) JEW(fyi); Sub-Collections: SRI-ARC;
Clerk: CHI;

time zones in OP directives

Elizabeth, RLL's suggestions for time zone's in (20109,) seem
reasonable to me. What do you all think. -- Charles.   1

time zones in OP directives

(J20746)   6-DEC-73 09:52;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /EKM NDM DVN; Sub-Collections: SRI-ARC; Clerk: CHI;

Craig Maxwell

Anita,
Can you tell me if Craig Maxwell is still with NMC? We keep getting
things back that we send him...
Marcia   1

Craig Maxwell

(J20747) 6-DEC-73 09:54; Title: Author(s): Marcia Lynn Keeney/MLK;
Distribution: /ALC; Sub-Collections: SRI-ARC; Clerk: MLK;

re 20106: CM moving to .0 + 1

This problem is known and will be corrected in next major release of
NLS. If this is not soon enough, please let me know. This next
release will be up at ARC by the first of the year but perhaps Feb
for the Utility. -- Charles.   1

re 20106: CM moving to .0 + 1

(J20748) 6-DEC-73 09:55; Title: Author(s): Charles H. Irby/CHI;
Distribution: /RLL; Sub-Collections: SRI-ARC; Clerk: CHI;

re 20579 : ARPA Final Report Planning

Dick, following is my opinion on your proposed paper for the final
report (I thought of no new ones):

Definitely should do:
    1,2,3,5,8,9,10,12,13,14,18,19,23,26,27
Probablly should do:
    4,6(could be combined with 5),7,11,15,16,17,21,23b,24,
    25b,28(could be combined with 27),29(ditto),31-35
Questionable value to reader outside ARC:
    20,22,25c-25e,30(combine with 27)
Questionable value even to us:
    16b(since it has never really been used),25(tools used are too
    primitive)

-- Charles.   1

re 20579 : ARPA Final Report Planning

(J20749)   6-DEC-73 10:12;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /RWW; Sub-Collections: SRI-ARC; Clerk: CHI;

re JEW's 20543 Journal Privacy Proposal

Jim, your proposal for Journal Privacy seems fine for the short term with the following exceptions:

1) The clerk's ident should be included in the access list, since he/she clearly had an opportunity to read it before submitting it and may be called upon by the author to print copies of it, etc. I view a clerk as a private secretary and think she will actually be doing all of the work on the system. The CLERK command is being removed from the Journal subsystem.

2) You should make provision for the author (or his clerk) to expand the access list or declasify it all together.

3) We should change the Ident File so that the check you have to make can be fast (say by cross linking group members to groups rather than trying to construct the string you suggested (which will take considerable time).

4) I dislike the connect to ident model. I would prefer a RELOGIN command which logically did a LOGOUT/LOGIN for the user.

5) I think this facility should be made available to all NLS files and viewed as an additional layer of protection on top of that provided by TENEX.

-- Charles.

1

re JEW's 20543 Journal Privacy Proposal

(J20750)   6-DEC-73 10:38;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: CHI;

re 20498, NLS command execution time estimates

Alan, your suggestion re timing estimates for certain potentially
lengthy commands is quite reasonable. We will see what we can do.
In the mean time I would suggest the use of the Execute File status
command to indicate the size of the file before you print it.

-- Charles Irby.   1

re 20498, NLS command execution time estimates

(J20751)   6-DEC-73 10:43;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /ARH; Sub-Collections: SRI-ARC; Clerk: CHI;

re MDK's 20574, Quasi Partial Copies

Note also that you, as inventor of the FIXED recognition scheme
(requiring uniquness in three characters), have proposed the command
word DIRECTIVE which conflicts with DIRECTORY to SIX characters   The
three charcter uniqeness is going to be hard to ensure.

re MDK's 20574, Quasi Partial Copies

Mike, just wanted to let you know that I have read your proposal for
QPC's etc. I will prepare a more substantial reply, but I wanted you
to know that most (if not all) of what you suggest can be
accomplished via the Journal catalog without the need of a new
mechanism. Also, I wanted you to know that the Output Processor has
to scan every character of the file anyway, so there is no inherant
reason why separating the directives would make it faster. The
reason it is slow is its implementation (how it scans those
characters) not the fact that the directives are embedded (although
this may add a couple of percent to a reasonable implementation).

-- Charles.   1

re MDK's 20574, Quasi Partial Copies

(J20752)   6-DEC-73 10:51;   Title: Author(s): Charles H. Irby/CHI;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: CHI;

Bad files

I have been having a rash of bad files in the last week or week and a half. In most cases they can be saved by outputting the file. In a couple of cases I found strings of garbage such as <nul>s and other nonsense. Don't know if this is of interest to anyone but am noting it fyi.   JAKE

1

Bad files

(J20753)   6-DEC-73 10:53;   Title: Author(s): Elizabeth J. (Jake)
Feinler/JAKE; Distribution: /BUGS; Sub-Collections: SRI-ARC BUGS; Clerk:
JAKE;

A Group Allocation for Analysis

I would like to get your reaction.

A Group Allocation for Analysis

When the NET and RADC users are moved over to the Utility, I would
like to get a group allocation for Analysis. We need one guaranteed
slot for Analysis at all times. We will not be heavy users (2-3%
maximum), but we need free access at all times and under all
operational conditions if we are to do our job effectively. We must
be able to collect data and observe what is going on on the system
without any constraints. We must be able to do spot checks, to
conduct tests, to link to users or conduct any sampling we deem
necessary without having to disrupt the online operations of another
group of people.   1

I feel that this independence is necessary. I feel that it would not
disrupt anything within ARC and I know that it can be done now. I
would like to get your agreement on this matter as soon as possible.
Would a meeting be helpful?   2

A Group Allocation for Analysis

(J20754) 6-DEC-73 11:34;   Title: Author(s): Paul Rech/PR;
Distribution: /DCE JCN RWW SRL WRF; Sub-Collections: SRI-ARC; Clerk:
JML;
Origin: <LEAVITT>FUN.NLS;2, 6-DEC-73 11:29 JML ;

Don't forget Greenwich time for our friends in London and Alaoha
time.   1

responds to (20746) and (20109).

PI Report - Harvard University, Feb 1974

Principal Investigator's Report, ARPA IPT Principal Investigators
Meeting, Los Angeles, Feb. 6-8, 1974. Part of NIC 20414.

PI Report - Harvard University, Feb 1974

NIC 20764
Part of NIC 20414   1

1973 ARPA Project Summary   2

Prepared for: ARPA IPT Principal Investigators Conference
Los Angeles, Feb. 6-8, 1974   3

Prepared by: T. E. Cheatham
Harvard University
Aiken Computation Laboratory
33 Oxford Street
Cambridge, Massachusetts 02138   4

The ECL Programming System   5

The programming language EL1 has been specifically designed as a tool
for tackling difficult programming projects, i.e.,
projects on which existing languages could be used only with
considerable waste in machine and programmer time. A
programming language must, of course, be considered in the
context of a wider framework -- the environment in which it
operates. Along with the language EL1, a programming
system, ECL, has been designed to provide an environment for
the human-oriented use of the language. The programming
system allows on-line conversational construction, testing,
and running of programs. In addition, the system provides a
significant number of facilities which systematically extend
the range of the language.   6

During the past year, the compiler went into fully
operational status, an EL1-oriented editor was designed and
implemented, a prototype version of the closure mechanism
was coded, and a measurement subsystem was designed,
implemented, and integrated into ECL.   7

1. Compiler. The compiler was checked out,
improved, provided with a good human interface, and released
for general use. Preliminary user documentation was issued.
Work continues on documentation, debugging, and various
local improvements. Work on the addition of an optimizing
phase has been started.   8

2. Editor. The editor was designed to provide a
language-oriented tool for the manipulation of EL1 programs.
It is a processor fully knowledgeable of the language and
equipped with commands specifically oriented to this task,
thus providing the programmer with a convenient editing

PI Report - Harvard University, Feb 1974

capability far more powerful than character string
replacement. The editor is now documented and operational.   9

3. Closure. Closure may be regarded as a synthesis
of three distinct software construction tools: a mechanism
for fixing the values of variables, a program simplifier,
and a program specializer. This mechanism is used to
contract a program which has been constructed via the
structured programming technique of developing functional
modules by refinement to dramatically reduce the overhead
which would otherwise result from the layers of extension.
A prototype version of the closure mechanism was coded, and
documented.   10

4. Measurement-package. This package of routines
provides a means for making various measurements on programs
and functions. A count of the number of times a function is
used can be kept or the frequency of execution of each
statement can also be counted. The cumulative execution
time of functions and programs can also be measured. In
addition, there are routines to reinitialize or remove
counters and to print their values.   11

Automatic Programming   12

The goal of this research is a practical, running system
that will partially automate the task of constructing
real-world programs. Automating programming entails
transferring to the computer those facets of programming
which are not carried out efficiently by humans. It is felt
that the activities most in need of such transfer are the
verification and optimization (in a very broad sense of the
word) of programs. The orientation of the research,
therefore, is toward the development of a system capable of
mechanical program verification and of mechanical
improvement upon an existing program.   13

During the past year solutions were found for two
key problems which are fundamental to providing the
technology on which such an automatic programming system
must rely.   14

1. Property-extraction. Program optimization is
typically effected by exploiting some invariance. Local
invariances are relatively easy to discover and are used in
many compilers. Complex invariances are harder to discover
but have a far larger potential payoff since they allow
substantial optimization by source-level transformation.   15

PI Report - Harvard University, Feb 1974

To carry out significant program optimization, it is
necessary to determine such properties at each program unit.
Techniques have been developed for property computation in
iterative and recursive programs when the properties of
interest are a well-founded partially ordered set and the
application of these techniques to a variety of property
sets was analyzed.   16

2. Synthesis-of-loop-predicates. Current methods
for mechanical program verification require a complete
predicate specification on each loop. Because this is
tedious and error-prone, producing a program with complete,
correct predicates is reasonably difficult and would be
facilitated by machine assistance. Techniques for
mechanically synthesizing loop predicates were studied, and
heuristic methods which derive loop predicates from boundary
conditions and/or partially specified inductive assertions
were developed. Also, as variety of supplementary methods
to develop auxiliary predicates required to facilitate the
employment of heuristic techniques were examined.
Implementation of these techniques has been started.   17

PI Report - Harvard University, Feb 1974

SUMMARY OF 1973 ACCOMPLISHMENTS BY SRI-ARC FOR IPTO
1973 ARPA Project Summary

Prepared for: ARPA IPT Principal Investigators Conference
Los Angeles, Feb 6-8, 1974

Prepared by: Douglas C. Engelbart, Richard W. Watson, James C. Norton
Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

1

SUMMARY OF 1973 ACCOMPLISHMENTS BY SRI-ARC FOR IPTO
1973 ARPA Project Summary

INTRODUCTION

ARC has taken major steps toward two main goals:

1). Understanding and implementation of distributed system structures and the user interface for a knowledge workshop that provides a coherent, consistent, and flexible user window to a wide range of intercommunicating tools existing within a resource sharing computer network.

2). Obtaining wide application use of the evolving knowledge workshop within a framework of Application to a variety of real work environments, Analysis of the experience, Development to yield an improving fit between needs and capabiities.

The steps taken toward these goals are described below.

DEVELOPMENT

NLS USER INTERFACE

ARC has achieved significant results in increasing the flexibility, ease of use, implementation simplicity and generality of the NLS user interface. Work was completed on design and implementation of a command meta-language (CML) and command interpreter system allowing higher level language specification of the user interface. The user interface specification is compiled into a tree of instructions to drive the command interpreter, providing centralized command parsing and user feedback.

The approach taken allows experimentation with different command language structures and feedback, simplification of subsystem implementations, and adaptation of the user interface to individual preferences.

It also allows NLS "frontend" functions to be moved to a mini-computer. Such a move will benefit evolution of a Knowledge Workshop system using tools distributed over a network of hosts accessible with a coherent user interface from mini-computer controlled terminals. It will also cut hourly usage costs significantly. (We expect to cut NLS usage cost in half in each of the next two years by this means). The approach has already yielded a 25% source code compaction and an increase in running efficiency.

Other changes include:

A cleanup and redesign of the command language to remove known inconsistencies, to add more novice oriented features, and to benefit from two years of Network experience.

Addition of a User Profile System to allow the user to specify

his private, default profile of optional user interface
parameters.

Addition of more Help facilities to provide either quick menu
help or direct branching to complete, queryable documentation
starting at a point related to an immediate problem. First level
Help cues are derived automatically from the CML specification.

A restructuring of NLS functions into cleanly intercommunicating
subsystems.

Addition of initial features of an NLS Macro or Programming
facility. Present user-written programs in the L-10 programming
language have been made readily accessible in a single
directory.

DIALOG SUPPORT SYSTEM

The NLS Journal system has been integrated into the Network mail
system for both delivery and input, and we have taken a leading
role in the creation of a network mail protocol.

We began design of a distributed Journal system and associated
Network protocols that will allow various Journal functions such as
distribution, recording, cataloging, storage and retrieval to be on
separate Network hosts. Besides allowing the Journal to run
cooperatively on several Network hosts, this system work provides
new insights into resource sharing techniques and concepts for
Network mail protocol evolution.

We implemented an initial system allowing Journal systems on two
Network-based PDP-10s to work cooperatively.

Privacy protection capabilities are being added to the Journal.

INFORMATION STORAGE AND RETRIEVAL

The NLS Query subsystem has been improved, to allow multiple NLS
file data bases, and in its user interface. A subset of Query
features are used in the Help system incorporated in the new user
interface.

Planning has begun for integration of NLS with Network data
management facilities such as the Datacomputer.

DISPLAY CONCEPTS AND TERMINALS

Steps have been taken to make the display version of NLS more
easily available to Network users. Since 1972 it has been
available from IMLAC terminals. In 1973 we developed an
inexpensive micro-computer box, called a Line Processor.

The Line Processor and associated software allow low cost
mass-produced alphanumeric displays to be used (without
modification) with a Mouse and a Keyset (connected to the Line
Processor) as two dimensional Display NLS terminals.   An
important aspect of this work was the extension of the NLS
virtual terminal concept and development of associated
communication protocols. The results were also used in the
Network Graphics protocol.

Arrangements have been made to have Line Processors commercially manufactured for about $1800 apiece. The first Network usage of Line Processor supported alphanumeric terminals is expected this Spring.

3

We participated actively with the Network Graphics Group in the development of the proposed Network Graphics Protocol.

OPERATING SYSTEM

The backup file archival and dump system, BSYS, developed at ARC, was released to the Tenex community.

A Group Allocation system allowing controlled access to the system on a login slot basis was built and put into operation and released to the Tenex community. This system allows the user population to be split into groups and each group assigned a given quota during different time periods during the day. An express login capability for short tasks such as printing a file or reading one's mail is also part of the scheme.

Tenex changes necessary to support the typewriter version of NLS have been incorporated into the standard BBN-released Tenex to allow future support of NLS on any Tenex. Similar work to support the display version of NLS from standard Tenex is proceeding.

NEW NLS SUBSYSTEMS

A number of new NLS subsystems have been built: a calculator that allows operands and results to be obtained and placed in NLS files, either by interactive selection or by L10 programs; an offline text entry and editor using magnetic tape cassettes; some Tenex level functions (such as file system and FTP manipulation operations) have been made available at the NLS user level; and source level debugging facilities.

APPLICATIONS

KNOWLEDGE WORKSHOP UTILITY

A contract was initiated to have Tymshare install and operate a PDP-10 to run NLS for Network exploratory application of NLS-based Knowledge workshop technology. Tymshare personnel have been trained in Tenex maintenance. ARPA-IPT has subscribed in a separate contract to 60% of the expected capacity, and has installed a TIP at Tymshare.

NETWORK INFORMATION CENTER

ONGOING ACTIVITIES

Dialog support service was provided to the Network user community, principally through the RFC mechanism and through the Journal and Catalog systems.

Reference support service was provided to the Network user community, principally through the Resource Notebook (both online and offline), and through distribution of Network Protocol documents to sites, associates, and other requestors.

Information was provided to visitors interested in an understanding of the Network's technology and resource composition.

Participation was carried on in Network working groups

pertaining to protocols, and users' needs and interests.

Editing and publishing assistance was given for the online and
offline versions of the AI Newsletter.

NEW ACCOMPLISHMENTS

A new "paperback" ARPANET Directory was designed, published, and
distributed.

The ARPANET News, under editorship of MITRE's Jean Iseli, was
published and distributed by NIC on a regular basis both online
and in hardcopy. The NIC also contributed editorial assistance.

The Official Network Hostnames were straightened out (a major
undertaking), published, and a list maintained with help from
Nancy Neigus of EBN, and Vint Cerf of Stanford.

Significant contributions were made to the establishment of
overall design criteria for both the NLS HELP system and the NIC
QUERY system, a mechanism for browsing through and selecting
particular pieces of information from highly structured files of
general interest, such as the Network Resource Notebook.

The NIC's operations were quantitatively analyzed, to determine
costs and scope of operations. Goals, problems, and requirements
of the NIC were described in the framework of its then present
(Fall '73) vector, in order to stimulate active discussions of,
and decisions about, the NIC's future role. It has been
proposed to serve the whole-Net user population with a set of
simplified basic services to be paid for from Network overhead
funds and to consider special sets of modular services for
special-interest ARPANET user communities to be separately
negotiated and funded.

ANALYSIS

A new function within ARC, called Analysis, has been established to:

Develop and publish methodology for analyzing Workshop systems such
as NLS in all their aspects, system operation, user needs and usage
patterns etc.

Publish results of the studies of existing operational experience.

Feed results back to developers for further system evolution.

Initial studies have been started in the areas of system and usage
economics and usage patterns, command timing and usage frequency, and
comparison between systems.

5

Speech Understanding Research at Lincoln Laboratory, 1973 ARPA
Project Summary

Principal Investigator's Report, Lincoln Laboratory, ARPA-IPT
Principal Investigators Conference, Los Angeles, Feb. 6-8, 1974

Speech Understanding Research at Lincoln Laboratory, 1973 ARPA
Project Summary

NIC 20769
 Part of NIC 20414

Speech Understanding Research at Lincoln Laboratory
1973 ARPA Project Summary

1

Prepared for: ARPA IPT Principal Investigators Conference
Los Angeles, Feb 6-8,1974

2

Prepared by: James W. Forgie
MIT Lincoln Laboratory
Lexington, Massachusetts   02173

3

During 1973, Lincoln Laboratory work in Speech Understanding Systems
has been directed toward the development of an experimental speech
understanding system. The system task is the vocal command of a data
retrieval, analysis, and display facility intended to support a
researcher in studying the acoustic correlates of phonemic events.
The system, scheduled for completion in April 1974, was sufficiently
far advanced by December 1973 to successfully recognize a number of
sentences in preliminary tests involving vocabularies of 200 to 500
words and context-free grammars of 111 to 300 production statements.

4

The Lincoln system in its present form is composed of two modules.
One is a phonetic recognition module which takes the speech waveform
as input and produces a string of acoustic phonetic elements (APEL"s)
as output. The other is a linguistic processing module which uses a
lexicon and a grammar to propose and score sentences which could fit
the APEL string. A complete speech understanding system would include
a third module to provide an appropriate response for sentences
recognized by the linguistic module taking into account information
regarding the state of the world applicable to the task domain. Our
work on the latter module has not progressed beyond the design stage,
and our system to date might be more correctly termed a speech
recognition system.

5

The following two sections describe our work on the phonetic
recognition and linguistic modules and related research.

6

Phonetic Recognition

7

Work on phonetic recognition is divided between the Laboratory"s
Fast Digital Processor (FDP) and TX-2 computers. The FDP handles
jobs which require much computation of a signal processing nature
such as extraction of linear predictive coefficients (LPC"s) and
spectrum analysis. The FDP also does phoneme class segmentationand

Speech Understanding Research at Lincoln Laboratory, 1973 ARPA
Project Summary

formant tracking. Consider- able effort has been devoted to
achieving accurate formant tracking for use as basic input to
phoneme identification programs. Our formant tracker uses
appropriate smoothing and consistency rules to associate peaks in
the LPC spectra with formants. Spectral enhancement, obtained by
recomputing the spectrum on a circle of radius less than one, is
used to resolve merged peaks or bring out peaks which had been
lost due to nasalization effects. Excellent results are being
obtained.   7a

Segment identifications in terms of APEL"s is carried out on TX-2.
The APEL"s in many cases correspond to phonemes, but in some cases
represent phoneme classes such as nasals which are not yet further
differentiated. A first version of a complete acoustic phonetic
""front end"" has been integrated and tested with a corpus of 73
sentences. The results are represented by a set of confusion
matrices which cannot be readily condensed into a single number or
a few words. We feel that they are encouraging and roughly
represent a capability to adequately handle a task with a
vocabulary between 100 and 200 words with moderate linguistic and
semantic support.   7b

Linguistics   8

Our work in linguistics has been pursuing alternative approaches
to the problem of finding and scoring sentence candidates. These
approaches are intended to explore different parse and scoring
strategies, different points of application of phonological rules,
and the potential for parallel processing. The approaches are
identified by the names LPARS, CASPERS, VASSAL AND GSP.   8a

LPARS was developed by P. L. Miller for his Ph.D. thesis at MIT.
It recognizes local parse structures anywhere in an utterance and
later connects them by searching for words that might reasonably
exist between them. The LPARS work is complete and will be
published as L.L. Technical Report 503.   8b

CASPERS is being developed by J. Klovstad for his thesis at MIT.
CASPERS uses our augmented context-free grammar, and left-to-right
parse, and a degarbling dictionary lookup process that can handle
the application of phonological rules across word boundaries. The
system design aims at the efficient use of the available
information.   8c

VASSAL uses heuristic search techniques and a finite context-free
grammar. It can parse either left-to-right or outward from
""islands of reliability"" found within an utterance. It has been

Speech Understanding Research at Lincoln Laboratory, 1973 ARPA
Project Summary

developed as a vehicle for exploring the effectiveness of various
heuristics in control- ling the search program.   8d

GSP is based on the General Syntax Processor concept of R. Kaplan.
We view GSP as a good vehicle for studying parsing strategies and
for investigating the potential for parallel processing in
linguistic applica- tions. We have developed a GSP system with
graphic displays and tablet interaction which allows a user to
watch a parsing process in action and control the order in which
possibilities are tired.   8e

Both VASSAL and CASPERS have been used successfully in tests with
the phonetic recognition module.   8f

Speech Data Base   9

The Lincoln speech data base now contains 200 utterances with
phonetic labels and processing results. It is accessible to the
network via TELNET and data retrieval is possible via SURNET, a
protocol based on the standard file transfer protocol.   9a

Password Scheme   10

We have developed a password scheme which does not require secrecy
and which is, therefore, well suited to the open environment of
TX-2. All aspects of the scheme may be known to anyone attempting
to intrude. A journal article on the scheme has been prepared and
implementation is contemplated for the near future.   10a

TX-2 System   11

The TX-2 system has been extended by the addition of an IBM
3830/3330 disk system.The new disk now handles all file storage
and user swapping with significant improvement in performance.   11a

Speech Understanding Research at Lincoln Laboratory, 1973 ARPA
Project Summary

(J20769) 7-MAR-74 09:15;   Title: Author(s): James W. Forgie/JWF;
Keywords: ARPA-IPT PI Conference 1974; Sub-Collections: NIC; Clerk: MEJ;
Origin: <NIC>PI-FORGIE.NLS;1, 7-MAR-74 09:08 MEJ ;

The SRI Artificial Intelligence Center - 1973 ARPA Project Summary
(ARPA-IPT PI Conf,)

NIC 20778 Part of Nic 20414

1

THE SRI ARTIFICIAL INTELLIGENCE CENTER
1973 ARPA Project Summary

2

Prepared for: ARPA IPT Principal investigators conference
Los Angeles, February 6-8, 1974

3

Prepared by: Peter E, Hart
Stanford Research Institute
Artificial Intelligence Center
333 Ravenswood Avenue
Menlo Park, California 94025

4

I   ARTIFICIAL INTELLIGENCE PROJECT

5

A, New Directions, In the past year we initiated a major change
in direction on our AI Project as we ceased experimentation in the
do- main of a mobile robot and began work on a computer-based
consultant system, We plan ultimately to have the system advise a
human apprentice technician about how to install, operate, modify,
troubleshoot, and as- semble electromechanical equipment,
Although we have selected a new task domain, we remain committed
to the central AI topics of problem solving, visual perception,
modeling and speech understanding as primary areas of interest,
Work on these topics, as outlined below, is intended to contribute
to the consultant system.

5a

B, Problem Solving, We have worked out most of the design
details for a "procedural net" system, a new hierarchical
plan-generation and execution-monitoring system, The system
generates a network structure that allows a plan to be presented
at varying levels of detail in order to match the apprentice's
ability,
We have also designed and implemented in QLISP a program that
simulates the top-level behavior of an automatically controlled
air com- pressor, This program models many of the
cause-and-effect relations that determine the compressor's
behavior, and can thus be used as an in- formation source for
programs that do trouble shooting and question answering,

5b

c, Perception, We have implemented an interactive scene

The SRI Artificial Intelligence Center — 1973 ARPA Project Summary
(ARPA-IPT PI Conf.)

interpre- tation system specifically designed for expressing, and
experimenting with, perceptual strategies. The system allows an
experimenter to ex- press basic perceptual concepts to a computer
using pictorial examples, and to build up more complicated
structures from these basic concepts using both symbolic and
graphical means. The system has been used to formulate
interactively (1) descriptions that distinguish some objects
commonly found in indoor room scenes (e.g., a chair or table), and
(2) corresponding programs that locate these objects in images.
We are si- multaneously working on a perceptual executive intended
to create such programs automatically.
We have designed and implemented, in a preliminary fashion, a
semantic scene-understanding system in which locally ambiguous
scene interpretations are disambiguated using global constraints
supplied by a user. The hallmark of the initial work is the
redundancy of suitable constraints in typical scenes and the ease
with which such constraints may be interactively specified.

5c

The feasibility of a scanning, time-of flight range finder which
will develop a field of depth values was demonstrated with the
completion of a prototype version.

5d

II   SPEECH UNDERSTANDING PROJECT

6

As part of the ARPA Speech Understanding Program, we implemented
the second version of a speech understanding system intended for
situa- tions where accomplishment of a relatively complex task
requires a dia- log with the user involving the achievement of a
number of subgoals. The design of the system is distinctive in the
way that various sources of knowledge--syntactic, semantic,
pragmatic (and, potentially, prosodic and acoustic-phonetic)--are
coordinated through a parser (1) to guide the application of
acoustic processing algorithms and (2) to relate the results of a
successful parse to operations on a model of a particular task
domain.

6a

III   SPEECH COMPRESSION PROJECT

7

A. Speech Digitization by LPC Estimation. The Telecommunications
Department at SRI has been successful in developing an LPC
compression system that offers high-quality speech transmission
with a compression factor of 3 to 6 greater than achieved by
previous techniques. As a result, the average bit rate

requirement has been reduced to approximately 1000 to 1500 BPS for
packet communication systems.

7a

B. Speech Digitization Excitation Study. This effort has deve-
loped the concept of a voice-excited linear predictive vocoder.
While this method of providing excitation to the linear predictive
synthesizer requires a higher transmitted bit rate (approximately
8000 to 9600 BPS) than pitch-excited techniques, it cannot make
pitch errors and voice- unvoiced decision errors common to the
latter technique.

7b

IV   RELATED TOPICS

8

A. Industrial Automation. Under joint support from NSF and pri-
vate industrial firms, we have begun a program to develop advanced
automation techniques. This program is of broad scope. It
includes the development of new hardware like hands and sensors,
the development of software for "programming-by-doing" inspection
and manipulation rou- tines, and the use of an industrial Unimate
manipulator under program control. Along with its technical
content, which stems in good measure from our AI work, the program
is beginning to attract attention because of the mechanism it has
established to transfer research results to actual or potential
industrial users.

8a

B. Qlisp. We have implemented a QA4-like language as an
extension of INTERLISP with two major attendant advantages: the
elegant program- ming environment provided by INTERLISP is
available to the QLISP pro- grammer, and program execution time
has been speeded up by a factor of between 10 and 30. QLISP is
becoming our main language for problem- solving and modeling
programs, and is also being used at Stanford for automatic
programming research. A modular and readable program veri- fier
has been written in QLISP and has been used to prove the cor-
rectness of several fairly complex algorithms.

8b

3

The SRI Artificial Intelligence Center - 1973 ARPA Project Summary
(ARPA-IPT PI Conf.)

(J20778) 24-APR-74 14:44;   Title: Author(s): Peter E. Hart/PEH;
Keywords: ARPA-IPT PI Conference; Sub-Collections: NIC SRI-ARC; Clerk:
MEJ;
Origin: <NIC>PI-HART.NLS;1, 24-APR-74 14:40 MEJ ;

The Practical Impact of Recent Computer Advances on the Analysis and Design of Large Scale Networks

NIC 20785
Part of NIC 20414

1

The Practical Impact of Recent Computer Advances on the
Analysis and Design of Large Scale Networks

2

Prepared for:
ARPA-IPT Principal Investigators Conference
Los Angeles, Feb. 6-8, 1974

3

Prepared by:
Howard Frank
Network Analysis Corporation
Beechwood, Old Tappan Road
Glen Cove, New York 11542

4

Network Analysis Corporation's contract with ARPA has the following major objectives:

5

(1) The development of techniques for the analysis and design of large computer networks for resource sharing and communications;

5a

(2) The application of these techniques to study the properties of such networks for use in studying Defense Department computer and communication requirements; and

5b

(3) The application of recent computer advances, such as interactive display devices and distributed computing, to the analysis and design of large scale networks.

5c

The following were major accomplishments during the past year:

6

A study of the effect of point-to-point and broadcast satellite channels on ARPANET cost and throughput was completed.

6a

The Practical Impact of Recent Computer Advances on the Analysis and
Design of Large Scale Networks

Investigations of large network routing schemes were continued
including new routing methods for both high bandwidth and for
partitioned networks.

6b

A multiplexing experiment to obtain low cost leased line terminal
access to ARPANET was successfully completed. Four CRT terminals
are now operating on a single 4800 BPS line into ARPANET TIP.

6c

The first phase of an interactive network data handling system has
been completed for an IMLAC display editing system for large
network graphics.

6d

Part 1 of a study of network reliability and economics for a
systems with 1000 nodes was completed.

6e

A new large network design technique, based on "cut-saturation"
was developed and found to be more cost effective than the branch
exchange techniques currently in use.

6f

The second phase of a study of terminal oriented network cost and
performance was completed.

6g

The definition of a network analysis problem solving system was
completed. This includes system deffnitions for network data
structure manipulation, network algorithm programming, and the
first phase in the specification of a network programming
language.

6h

The first phase fo a detailed, event oriented simulation model to
develop flow control and routing algorithms was completed for the
packet radio system.

6i

A study of the combination of packet broadcast technologies and
two-way coaxial cable system for use in urban and suburban
environments was completed.

6j

Major progress was made in the development of flow control and
routing techniques for packet radio.

6k

The Practical Impact of Recent Computer Advances on the Analysis and
Design of Large Scale Networks

Recent technical publications are given below. In addition,
approximately 10 new publications are presently in preparation.

7

"Tools for Planning and Designing Data Communications Networks",
Proceedings of the National Computer Conference, May 1974.

7a

"On Splitting Random Accessed Broadcast Communications Channels",
Seventh Hawaii International Conference on System Sciences,
January 8-10, 1974.

7b

"Packet Switching Network Design: A Case Study," National
Telecommunications Conference, Atlanta, Georgia, November 26-28,
1973.

7c

"Deterministic and Adaptive Routing Policies in Packet-Switched
Computer Networks," Proceedings of the IEEE ACM Conference on Data
Networks, Tampa, Florida, November 12-15, 1973.

7d

"A Unified Algorithm of Designing Multidrop Teleprocessing
Networks," Data Networks: Analysis and Design, Third Annual Data
Communication Symposium, November, 1973.

7e

"Computational Considerations and Routing Problems for Large
Computer Communication Nets," National Telecommunications
Conference, Atlanta, Georgia, November 1973.

7f

"Issues in the Design of Large Distributed Computer Communication
Networks," National Telecommunications Conference, Atlanta,
Georgia, November 1973.

7g

"Routing in Computer Networks," Networks, January 1973.

7h

"Avoiding Simulation in Simulating Computer Communication
Networks," National Computer Conference, 1973.

7i

"The Flow Deviation Method: An Approach to Store-and-Forward
Communication Network Design," Networks, January 1973.

7j

3

The Practical Impact of Recent Computer Advances on the Analysis and Design of Large Scale Networks

"Topological Optimization of Computer Networks," Proceedings of IEEE, November 1972.

7k

"Reliability Considerations in the Growth of Computer Communication Networks," National Telecommunications Conference, November 1973.

7l

"Recursive Analysis of Network Reliability", Networks, July 1973.

7m

The Practical Impact of Recent Computer Advances on the Analysis and
Design of Large Scale Networks

Project MAC, 1973 ARPA Project Summary, ARPA-IPT PI Conference, Los
Angeles, Feb. 6-8, 1974

NIC 20786
 1973 ARPA Project Summary

1

Prepared for:
 ARPA Principal Investigators Conference Los Angeles, Feb 6-8, 1974

2

Prepared by:
Edward Fredkin
Project MAC
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139 (617) 253-5851

3

In 1973 Project MAC continued work under ARPA support in the areas of
Automatic Programming, Computer Aided Programming, The Mathematical
Laboratory, Certification, Displays and Networks.

4

Automatic Programming: We are well underway on an ambitious and
long-range effort to discover and develop means for the realization
of systems that will make possible the automatic production and
maintenance of computer programs. We envision that the users of such
a system will engage it in a natural language discourse that will
cause the system to produce the programs, modifications or actions
that the user wants. The discourse and the resultant effects would be
limited to the narrow range of application of the systems' expertise.
This expertise must cover both the problem domain that the program is
to be applied to and the task of computer programming. In addition,
the system must have sufficient real world common knowledge in order
to deal with natural language and a modicum of common sense in order
to understand what the user wants. During 1973 a succession of three
experimental languages (MAPL, MAPL II, and OWL) were designed and
implemented to further our capabilities for representing knowledge.
Important progress was made on natural language systems, including
the task of incorporating Ogden's Basic English as an initial working
vocabulary. Many of the tasks of taking descriptions of domain
specific problems, in the area of inventory control, from high levels
of abstraction down through various layers of translation and
concretization have been programmed and tested. This includes the
final step of running automatically produced programs on a specified
target machine. In addition, an efficient and compatible LISP for
Multics has been implemented, debugged and documented.

5

Computer-Aided Programming: This is a branch of Automatic Programming
that has as its goal the creation of a programming environment that

will allow someone, skilled in the use of the system, to be assisted
in the tasks of creating, debugging and documenting a program. The
key to this concept is an on-line, interactive library of procedures
and data along with machine understandable information about the
function and use of these components. There are now in operation the
major parts of systems that augment a programmer's ability to
specify, retrieve, prepare, test, debug, validate, document, update
and understand programs. An extensive library of subroutines has been
continously expanded and an information retrieval system has been
implemented to enable users to access programs and other data on the
basis of the desired function rather than just on the basis of name.   6

The Mathematical Laboratory: This system is perhaps the most advanced
example in existence of an "expert" program. It is rapidly becoming
an important tool for substantive research. It seems clear that
further progress will lead to the time when nearly all of engineering
mathematics, and much of applied mathematics, will greatly profit
from the use of such systems. It is also clear that the users of
systems such as MACSYMA can benefit enormously from the addition of
some common sense knowledge and reasoning ability. This will allow
the system to take into account what the user is trying to accomplish
and to take advantage of knowledge of the physical reality
represented by the mathematical constructs. In 1973, a major set of
LISP improvements were implemented, including those that allow users
to share data in addition to code. This is of great importance in
making practical the delivery of such million byte systems to many
users simultaneously. MACSYMA was implemented on Multics. The EZGCD
algorithm, which is often linear when competing algorithms are
exponential, was developed and installed. Advanced representation for
rational functions have been installed and a complete users manual
has been published.   7

Certification: During 1973 we started a new program to explore how to
make the protection mechanisms of operating systems certifiably
correct -- or at least auditable. The vehicle for this research is a
special version of the central core of the Multics system, in which
we are restructuring areas such as the ARPANET communications
interface and the virtual memory support mechanisms, with the goal of
reducing the quantity of software which needs certification by an
order of magnitude, yet without sacrificing function. This particular
strategy, and vehicle, have been chosen in the hope of soon having a
practical impact.   8

Displays: During 1973 a high resolution display whose raster and
video are compatible with standard television was designed and
tested. The concept has proved successful, and we are negotiating
with potentail suppliers. This system is designed to provide low

EF2 11-MAR-74 13:16   20786

Project MAC, 1973 ARPA Project Summary, ARPA-IPT PI Conference, Los
Angeles, Feb. 6-8, 1974

cost, high resolution (1,000,000 point pictures) character displays
along with arbitrary graphical pictures.   9

Networks: Network service was maintained on Multics through a
replacement of hardware (the 6180 replaced the 645) and a switch to a
second network IMP. We are implementing the resource-sharing
protocol proposals of BBN, and we will propose new protocols for
authentication and resource usage controls. The Dynamic Modeling
System has implemented programs that automatically make use of
network resources without the user having to make explicit requests.   10

Project MAC, 1973 ARPA Project Summary, ARPA-IPT PI Conference, Los
Angeles, Feb. 6-8, 1974

(J20786) 11-MAR-74 13:16;   Title: Author(s): Edward Fredkin/EF2;
Keywords: ARPA IPT PI Conference 1974; Sub-Collections: NIC; Clerk: MEJ;
Origin: <NIC>PI-FREDKIN.NLS;1, 11-MAR-74 13:12 MEJ ;

Bolt Beranek & Newman Inc., ARPA Network Contract, 1973 Project
Summary

NIC 20788
Part of NIC 20414

1

ARPA Network Contract
1973 ARPA Project Summary

2

Prepared for:
ARPA IPT Principal Investigators Conference
Los Angeles, Feb 6-8, 1974

3

Prepared by   Frank E. Heart
Bolt Beranek and Newman Inc
Computer Systems Division
50 Moulton Street
Cambridge, Massachusetts 02138

4

During 1973 the network continued to expand at a healthy rate, and
fostering this expansion continued to occupy a central place in the
group's activities. The number of nodes on the net increased from 35
to 45, up 30%; geographical exansion was also noteworthy, with one of
the new nodes located at the Norwegian Seismic Array in Kjeller,
Norway, and another at the University of London in England.
Comparable growth was exhibited in the number of Host computers
connected (approximately four dozen at the end of 1973), the volume
of traffic on the net (grew by 250% to 2.75 million packets per day),
and the number of individuals making use of the network's facilities.
A figure for the latter is difficult to determine with any accuracy,
but at a recent count the Network Information Center recognized the
identities of some 2,000 users.   5

Other activities of particular interest have included the following: 6

   Four "Very Distant Host" interfaces were installed during 1973.
   The VDH option enhances network accessibility by allowing
   computers to connect to the network over error-controlled
   communications circuits.   6a

   All IMPs and TIPs in the network received memory retrofits during
   the year in order to improve performance and allow addition of new
   logical features; other hardware changes were implemented to
   permit more flexible configuration and improved reliability.   6b

   Improvements were made in the performance of the TIP, including

Bolt Beranek & Newman Inc., ARPA Network Contract, 1973 Project
Summary

better handling of modems and high speed lines, improved services
from the TENEX Resource Sharing Exec, and the adaptation to new
kinds of terminals. A notion which has aroused considerable
interest is the TIP's automatic remote use of TENEX, allowing a
small machine to exhibit large machine behavior.   6c

A continuing effort on network reliability has included sizable
software changes in the IMPs and TIPs to checksum data structures,
routing code, and routing messages in order to reduce the
sensitivity of the net to hardware failures. Other reliability
efforts included the completion of an auto-dialer facility for
testing TIP ports nationwide, improvements in trouble reports from
the IMPs to the Network Control Center, and a very large amount of
attention to detailed IMP, TIP, modem, terminal, and Host
connection troubles of all kinds.   6d

A major group effort continued on the design and construction of a
new modular line of IMPs based on the Lockheed SUE. By the end of
1973, an 11-processor version of the High-Speed IMP was operating,
and packets had moved between an old style IMP and a SUE-based
IMP. Designs were complete for all special BBN cards, and most
cards were in production form.   6e

Two satellite IMPs were completed and tested with initial versions
of the software; investigations of broadcast algorithms continued.   6f

We commenced a multi-stage change in the routing algorithms of the
net. By the end of 1973, changes had included improved routing
propagation and the ability to handle low speed circuits properly,
for example, the link to Norway.   6g

We played a leading role in the codification of new Telnet and
file transfer protocols and participated in the study of protocols
for international network interworking.   6h

We designed and began implementing a "Private Line Interface"
mini-Host to permit use of the network for secure traffic.   6i

We continued working on and have now nearly completed a "Remote
Job Entry" mini-Host to permit connection of RJE terminals to the
network.   6j

Finally, a major effort in addition to the activities above was
explaining those activities to the public, in the form of conference
participation, entertaining of visitors, and documentation. Most of
our existing manuals underwent at least one, and more often several,
major revisions; three new volumes were completed (and then regularly
updated): the documentation of the IMP, the TIP, and the Network

2

Bolt Beranek & Newman Inc., ARPA Network Contract, 1973 Project
Summary

Control Center programs. A long array of visitors included
delegations from Japan and the People's Republic of China.
Professional papers written during the year included:

7

"An Advanced Computer Communication Network," for the AIAA
Computer Network Systems Conference;

7a

"A   New Minicomputer/Multiprocessor for the ARPA Network," for the
1973 NCCE;

7b

"The ARPA Network," for the NATO Advanced Studies Institute in
Brighton, England;

7c

"Reliability Issues in the ARPA Network," for the ACM/IEEE 3rd
DATACOMM;

7d

"Design Considerations for Routing Algorithms in Computer
Networks," "The BBN Multiprocessor," and "The Satellite IMP for
the ARPA Computer Network," all for HICSS-7 1974;

7e

and "Some Computer Network Interconnection Issues," for the 1974
NCCE.

7f

Bolt Beranek & Newman Inc., ARPA Network Contract, 1973 Project
Summary

Response to your response (20449,) to my item (20452,) concerning
mouse and keyset codes. It will be nice to be able to input capital
viewspecs. It would be nicer if caps could be input in a stream of
lower-case just by pushing down one more button. If you are not
going to do anything with X0X character input combination, is it
possible to make it lowercase viewspecs as well as XX0?

1

(J20796)   6-DEC-73 14:29;   Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /CHI; Sub-Collections: SRI-ARC; Clerk: KIRK;

John, Bob, Steve (I'm not suree who has responsibility) we are
planning development work, see (20713,), on an NLS Frontend system to
control displays, feedback, command parsing, and even execution of
some common commands. This system will communicate over the ARPANET
to the backend system running on some host. To do our work we need
an IMP connection. We had counted on one of the two free ones on the
SRI IMP, but now find that they have been allocated, one to Stanford
the other to the SRI Speech project. This NLS Frontend project is a
major thrust and not being able to get an IMP slot would be a serious
problem. What suggestions can you offer? Thanks Dick   1

Need for an IMP Slot for SRI-ARC in Spring 74

(J20797) 6-DEC-73 17:14; Title: Author(s): Richard W. Watson/RWW;
Distribution: /REK2 SDC2 JSP JCN DCE CHI DCW DIA KEV; Sub-Collections:
SRI-ARC; Clerk: RWW;

A Reply and Thanks to CHI

Charles ... Thanks very much for your responses to my notes on the
NIC and on QPC's. It is gratifying to me that you agree with my
thoughts on the NIC and where its going, its problems, etc.

On QPC's, I'd be satisfied with almost any mechanism that allows one
to append information to a Journal item after it's been journalized.
But I think the QPC has wider applicability than just to back-links.
That's why I threw in the example of Output Processor directives: a
long-held objective of mine has been some reasonable way to eliminate
imbedded directives, and I perceived that QPC's could handle that
too. [Unless I specifically want to see them, directives really are
annoying as hell to me (and I presume to others) in display or output
quickprint.]

On the DIRECTORY / DIRECTIVE conflict, you're right of course: it
will be difficult to preserve the three character uniqueness. But I
think it's worth trying.   ... Mike

1

A Reply and Thanks to CHI

(J20798)   6-DEC-73 17:21;   Title: Author(s): Michael D. Kudlick/MDK;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: MDK;

Re: (20109,) & (20746,)

I think appending a letter to indicate time zone to the strings
generated by the directives GT and GDT is a reasonable addition.   Its
real merit lies in the expansion of NLS to other hosts (at present it
is never really ambiguous).   The four additional directives Mr.
Lieberman suggests are also very reasonable requests, particularly
considering the expected increase in Network use of NLS.   I would
hope that both these changes will be made, but they don't seem like
items of the highest priority at present.   1

Re: (20109,) & (20746,)

(J20799)   6-DEC-73 17:55;   Title: Author(s): N. Dean Meyer/NDM;
Distribution: /RLL JCN NP ILA CHI EKM HGL; Sub-Collections: SRI-ARC NP;
Clerk: NDM;

Output NLS command

See also (20027,) (20417,) (20737,).

Output NLS command

Output Device Teletype does not now allow one to produce a file
(sequential or otherwise) instead of printing. Output Device Printer
files would require a special Input Sequential routine to convert to
NLS (as CHI suggested). Elizabeth suggested that it would not be
very difficult for Output Device Teletype to produce a sequential or
NLS file (of one line statements) which might satisfy the need.
Pagination can be controled by the PSw directive (to accomodate both
JI and DHC). This seems like the easiest, cheapest, and most
straightforward way to go if we wish to provide an interim solution.   1

Output NLS command

(J20800) 6-DEC-73 18:01;   Title: Author(s): N. Dean Meyer/NDM;
Distribution: /OPIG CHI EKM HGL DHC JI; Sub-Collections: SRI-ARC OPIG;
Clerk: NDM;

Output NLS command

I tend to agrre with JEW, DIA, and DCW on the name "KWCS1". I'm still rather new to this business, but does everything in research have to be named with an acronym? If we took a name like KWCS1 to a marketing firm, they'd laugh. "Utility" means something which provides a useful service to the public; it's a nice word. Why not "Utility-one"?

1

(J20801)   6-DEC-73 18:09;   Title: Author(s): N. Dean Meyer/NDM;
Distribution: /SRI-ARC; Sub-Collections: SRI-ARC; Clerk: NDM;

INSEQH problem with double spaced file.

For some reason inseqh failed me for the first time on
<SIGART>WTLISP.TXT;1.   Could it be because this is the first double
spaced file sequential file on which I have tried to use it?   1

1

INSEQH problem with double spaced file.

(J20802)   6-DEC-73 20:12;   Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /NDM; Sub-Collections: SRI-ARC; Clerk: KIRK;

Update to the message below this one.

I besides the double space problem. I found blocks of text out of
place (last half of three paragraphs together at the end. Last two
branches in the middle. Second three paragraphs toward the end,
etc.).

1

Update to the message below this one.

(J20803)   6-DEC-73 20:38;   Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /NDM; Sub-Collections: SRI-ARC; Clerk: KIRK;

USING Network Service Report

Considerations in Defining
and Evaluating a Network Service

1

This report is the product of the Network Users Interest Working
Group (USING) Service Center Definition Committee. We would like to
thank Dave Walden (BBN-NET) for his suggestions.

2

This report attempts to list the parameters that are important when
defining performance criteria for a Network service.

3

Though we gave thought to the ordering of the listed categories, we
are not sure what meaning should be attached to that ordering.

4

It is hoped that the questions raised and/or left unanswered by this
report become objects of study by the Performance Measurement
Laboratory (Network Consumers Union), proposed by Craig Fields.

5

Specifically, we believe that such a laboratory should work to
develop a service rating system, so that users can know at a
glance what to expect from a service. We feel that a rating system
that would give an individual rating for each type of service
offered would be of the greatest usefulness. The definition of
such a rating system should be done in coordination with the
measurement of the various services to better insure completeness
and crediblity of the rating.

5a

The categories we have chosen are:

6

Context of Service
Predictability
Availability of Individual Services
Stability
Reliability
Accountability of Service and Personnel
Required Services
Optional Services
Security
Convenience
Helpfulness

6a

Please note our use of the word "service" instead of "system". Our
intention is to avoid confusion with the concept of an "operating
system". A machine with a given operating system may actually
offer a number of services (e.g., file storage, batch processing,
and interactive math computations). Our focus is upon INDIVIDUAL
services, rather than the overview of a site.   6b

Also note that we consider an operator of a service to be the
"owner" of the computing resource.   Other types of service are
possible (e.g., the ANTS project). Though peculiar requirements
may apply to these services, we do not consider them in this
report.   6c

The parameters: 7

1. Context of Service   7a

    "Context" embraces the concepts of the intent of a service and
    its relation to other services.   7a1

        What is the service intended to do?   7a1a

            Or, what is it optimized for?   7a1a1

        How well is it supposed to be able to perform?   7a1b

        Who is the service intended for?   7a1c

        What alternative services are available to the user?   7a1d

        Can the service be accessed by other than Network users?   7a1e

            In all cases, it is desireable that a service be
            accessible ONLY through the Network, so that all users
            (including systems programmers) get the same view of the
            system.   7a1e1

        Is the service "Network oriented"   7a1f

    A user's expectancies should match a service's context. This is
    most easily accomplished by having that context explained,
    BEFORE the service is used.   7a2

    Therefore, the services offered by a site should be
    well-defined and documented and a user should be able easily to
    discover what services are being offered by a site.   7a3

2. Predictability   7b

Predictability is basically the quality of not offering the
user any surprises (i.e., of meeting the user's expectancies).
Expectancies, in this case, should be distinguished from
idealized wishes, since a service will never meet the latter.   7b1

Predictability is essentially a psychological parameter and is
consequently somewhat difficult to measure. A service's
stability, reliability, and the user's awareness of a service's
context all affect the user's sense of the service's
predictability.   7b2

An important example of predictability is in the similarity
between some services.   7b3

    If two services (e.g., two Tenex's) claim to be ALMOST
    identical, then they should be EXACTLY identical. That is,
    if a user has reason to expect equivalence, the equivalence
    should be there.   7b3a

Another example is that of scheduled down-time.   7b4

    It is better for a service to be unavailable for the same
    two hours, everyday, than to be unavailable for six hours on
    two days of the week. The rule describing the service's
    availability is simpler for users to deal with.   7b4a

3. Availability of a Service   7c

A service's rate schedule and schedule of availability must be
easily obtainable.   7c1

    In a network environment, this means there should be a
    (virtual) central repository of such information. That is, a
    Network user needs to have a common interface to the
    information.   7c1a

A service must be sufficiently available to be useful.   7c2

    The minimum number of hours -- or whatever measure is to be
    used -- is not at all clear and will probably vary greatly.   7c2a

        An interactive service obviously needs to be available
        more than an hour per day.   7c2a1

        On the other hand one hour per day for a batch service,
        accessed only by demon processes at other services, could
        conceivably be adequate.   7c2a2

As a realizable starting point, we suggest 12 hours per day
and six days a week as an average minimum for a site's
availability to users.   7c2b

The desired goal is 24-hours per day, 7-days per week
availability. A service should justify any deviation from
this level of availability.   7c2c

   Even Preventive Maintenance periods that impact service
   availability should be minimized and regularized. (See
   section 2, on Predictability.)   7c2c1

4. Stability   7d

Major Changes to Server Host System   7d1

A Server Host should provide quality controlled assurance
that changes to its service do not invalidate previously
used procedures, subsystems, or other software facilities
without ample (minimum of one-month) notification to the
user community.   7d1a

   Known and predicted effects of changes must be well
   documented for users.   7d1a1

The quality controls should make reasonable attempts to
assure that new changes WORK, that adequate backup to the
replaced software is feasible (i.e., that the transition
isn't irreversible if major bugs are uncovered), and in
short that the user community's dependence on the service
isn't drastically affected without adequate alternatives.   7d1b

   Since any major change can be expected to have some
   deleterious effects, the phase-in of such changes should
   be timed for light-load periods. For example, the months
   of June and July would be poor choices for most projects.   7d1b1

Frequency of Changes to Billing (Rate) Schedule   7d2

Given the dependence of users on annual budgets, changes to
the billing schedule that increase users' costs should be
kept to a minimum.   7d2a

5. Reliability   7e

   Software and Hardware   7e1

      This can be measured in several ways, for example: 7e1a

         a) Number of crashes per day ;
         b) Average duration of crashes;
         c) Mean time to failure (mean time between crashes)   7e1a1

         Note: We define a "crash" to be an "unscheduled
         unavailability" that is the fault of the subject service
         (as opposed to the subnet, or other systems not under the
         control of the service).   7e1a2

      We suggest that a service be deemed "reliable" if it is
      fully operational and usable through the ARPANET at least 90
      percent of the time during which it is advertised to be
      available, with no more than three "crashes" during any six
      consecutive days' period of operation. Periods of six months
      should be used for computing average reliability.   7e1b

      A truly reliable service will be able to run through
      scheduled down-time. That is, it will continue FROM THE
      POINT AT WHICH IS STOPPED, rather than doing an
      auto-restart.   7e1c

   Files   7e2

      Lost or Damaged Files   7e2a

         If any file is lost or damaged as a result of hardware
         malfunction or operator error, any service dependent upon
         it will be considered to be not fully operational and
         usable commencing with the hour in which the problem was
         detected, and continuing until affected users are
         notified that the problem is corrected.   7e2a1

            Recovery of the latest intact version of a damaged or
            lost file should be accomplished within a four-hour
            period from the time of notification to the Server
            Host's Operations staff.   7e2a1a

**[6]

A billing credit for file storage charges incurred by a
user from the point in time that a file is damaged or
lost to the point in time that the latest intact version
of it is restored should be made to that user's account.
Additionally, we believe the user should be rebated for
costs incurred in getting the backed-up version of the
file to the state of the file that was lost.   7e2a2

Saving Changed Files   7e2b

The utility operation of saving changed files of the
on-line file storage medium by dumping them onto an
off-line, tertiary (back-up) storage medium such as
magnetic tape must be done at least once per day. (This
need not be the same function as "archiving", described
next.)   7e2b1

Files thus dumped must be saved on a systematic cyclic
retention basis, which we suggest should be something
like the following: 7e2b2

   Either: 7e2b2a

      CHANGED files should be dumped once per DAY and
      those so dumped during the most recent six days
      should be retrievable on request to the Server Host
      Operations Manager.   7e2b2a1

      ALL files should be dumped once per WEEK and those
      so dumped during the most recent four weeks should
      be retrievable on request to the Server Host
      Operations Manager.   7e2b2a2

      ALL files should be dumped once per MONTH and those
      so dumped during the most recent three months
      should be retrievable on request to the Server Host
      Operations Manager.   7e2b2a3

   Or: 7e2b2b

      A no-cost service should be provided which allows
      users to back-up and retrieve files. Files should
      be available from tertiary storage for one month.
      In the case of deferred execution of back-up
      requests, the actual copying of a file to/from
      tertiary storage should take place within 24 hours
      or the user's requesting the operation.   7e2b2b1

Archival Storage and Retrieval   7e2c

This service is almost the same as the second option for saving changed files (having users request specific files be archived). The difference is that archived files must be saved indefinitely.   7e2c1

6. Accountability of Service and Personnel   7f

A user should be able to find the source of a service's action (e.g., which operator cancelled the job and why?)   7f1

Software, usually in the form of machine-readable logs, should facilitate this whenever possible.   7f2

7. Required Services   7g

A. User Interfaces (Consultants and Operators)   7g1

A person knowledgeable in use of the Server Host software, and in problems associated with accessing the resource through the Network, must be available to answer requests for general (beginner-level) information. Manuals on usage should also be available to users.   7g1a

An operator should be on duty during all hours of service availability. Mechanisms should be provided for easily requesting specific operator actions.   7g1b

B. File Recovery   7g2

See "Reliability".   7g2a

C. User Billing Information   7g3

Accounting for Resources Used   7g3a

A detailed monthly report, indexed by relevant accounting parameters, must be provided to users who are billed for service usage.   7g3a1

An appropriate expenses-to-date statement should accompany every piece of output, for batch services, and every logout, for interactive services. It is recommended that a history file also be available for interrogation. This file would indicate dates, times and duration of access, according to each service used (e.g., cpu, tape i/o).   7g3a2

Usage Statistics   7g3b

Accompanying billing invoices, users should receive a
statement of what services were used in the billing time
period. Specifically, the statement should include a
detailed summary of storage usage, CPU cycles used,
"connect time" used, and usage of any other billed
entities, in appropriate units.   7g3b1

D. Documentation   7g4

User-oriented documentation should be available in the
following forms: 7g4a

   (1) A file conforming to the specifications of the USING
   Documentation Committee, including up to date NIC
   Resource Notebook data;   7g4a1

   (2) Primers and reference manuals for all available
   resources;   7g4a2

   (3) On-line HELP system (for interactive systems) to
   provide both novice and experienced users with on-line
   assistance in using the service;   7g4a3

   (4) Schedule of rates for services offered.   7g4a4

8. Optional Services   7h

Express/Priority Service   7h1

   Provision should exist for some type of rapid-turnaround
   (usually called "express"), guaranteed access, and/or
   guaranteed-percentage-of-cpu service. This would allow
   users requiring resources within a well defined set of
   minimum operations to receive system response at a rate
   greater than that for average users.   7h1a

Overnight/Off-hours Rates   7h2

   Provision should exist for reduced rates for use of computer
   resources during other than "prime" hours, both to encourage
   a leveling of the load average by moving non-essential jobs
   to off-hours, and to encourage more utilization of the
   service by users with limited funds.   7h2a

Demonstration Priviledges   7h3

   This is a variant of Express service and primarily consists
   in a service's working with a user for planned
   demonstrations, such a site visits.   7h3a

9. Security   7i

Security mechanisms should be provided to restrict access to
service's and user's resources. This should include restricting
the ability of systems programmers from accessing the workspace
of users.   7i1

   Obviously, this means that a person should be able to change
   his password without needing an intermediary (e.g., a
   systems programmer).   7i1a

Known bugs to security mechanisms should be corrected as
quickly as possible.   7i2

10. Convenience   7j

Convenience of use is measured by the number and nature of the
steps necessary to perform a task. A service's convenience
needs to be appropriate to the task it is intended to perform.   7j1

For our purposes, a service is sufficiently convenient to use
if it is perceived as such by its users.   7j2

11. Helpfulness   7k

Helpfulness is another concept that is hard to measure.   7k1

Basically, the degree of a service's helpfulness can be
assessed by finding the extent to which users feel they can get
assistance versus the extent to which they feel they are on
their own (and, in fact, to which they ARE on their own).   7k2

For our specific recommendations, see "Context of Service" and
"Documentation".   7k3

USING Network Service Report

(J20804) 1-FEB-74 16:32;   Title: Author(s): David H. Crocker, John D.
Day, Alan R. Hill, Michael D. Kudlick/DHC DAY ARH MDK; Distribution:
/USING USERS JCRL; Keywords: Users Service; Sub-Collections: NIC USING
USERS; Clerk: DHC;

test mail

dave this is a test message to see if it reaches you now. please rsvp
if you get tis.   if you don't let me know.   1

test mail

(J20806)   7-DEC-73 11:08;   Title: Author(s): Edmund J. Kennedy/EJK;
Distribution: /DLD2; Sub-Collections: RADC; Clerk: EJK;

Thoughts on the Automated Office

The purpose of this memo is to present some embryonic ideas of my own
about what I think a typical manager/staff officer/bureaucrat needs
in a computer-based workshop. The ideas are my own, based on
experience at military schools, a militry headquarters, and the ARPA
office. The time spent in formulating them is approximately equal to
the total character count divided by 10 characters per second.

1

Keeping in touch

2

Really, the main advantage of working in a computer at all is that
it potentially permits one to integrate one's communication with
the world with one's personal work space. Hence, I'd like the
following facilities:

2a

When I log in, I'd like to see a list of all the
communications, formal or informal, addressed to me. I'd like
to see them sorted both chronologically and in some sort of
priority order (for example, anything from my boss or HIS boss
should come first) and (optionally) a separate set of listings
by origin and/or subject matter.

2a1

I'd like to be able to send notes, pointers to files, etc. to
people anywhere without ever having to know the recipient's
real address. In other words, I'd like to sit down , hit a
control character if necessary, and type "Sam:..." If the
system doesn't know whom I'm addressing, it should break in and
politely inquire. Naturally, i expect that the message will
automatically be filed in my subject, recipient, and
chronological files. When someone isn't on the network, I'd
expect that a hard copy would be automatically generated
somewhere and mailed to the recipient.

2a2

I'd like to know positively and immediately if and when a
recipient read my mail to him, and I'd like automatic linking
of a chain of interactions on a given subject/set of
subjects...just the way a really smart secretary would file
things. But I don't really want to have to think up file
categories myself.

2a3

Finding information

3

I'd like to be able to instantly get an index of all the letters,
memos, reports, messages, etc. dealing with an individual,
subject, time period, or what have you. I should be able to make
such an inquiry in natural language, the system should let me
mis-spell moderately, and I shouldn't have to know in advance how
the system has filed things. Queries such as "What else has
happened this week about this matter?" should be handled
reasonably. Again, these listings should take account of my

Thoughts on the Automated Office

personal priorities, based on some sort of model of who I am, what
my job is, etc. ... just like a good secretary.   3a

This same information retrieval facility should, of course, be
automatically invocable by any other component of the system, so
that (for example) I could automatically introduce a chain of
background references into a document.   3b

Creating new documents   4

Here the basic facilities of the present NLS are quite suitable.
But I live in a world of sentences, paragraphs, chapters, etc.,
not branches and plexes. I'd like to be able to declare that I'd
writing a letter and have the system know automatically just I
(personally) like a letter to look. When (as will happen) things
come in from other environments, I'd like to be able to "Delete
paragraph 4, page 5 and insert the "LEGAL CONSIDERATIONS"
paragraph from my letter to Sam Jones yesterday." In other words,
I want highly structured text, but I want MY structure, not the
system's own peculiar notions.   4a

Discussing things informally with people   5

Something like FORUM should exist, but I want some extras: 5a

   I want the recording of the dialogue to be optional, permitting
   highly informal, completely ephemeral conversations. When a
   record is being kept, I think all participants should know
   about it explicitly. Dialogues that are kept would, of course,
   be retrievable as indicated above.   5a1

   I'd like to be able to set up conferences on a "when available"
   basis, by simply saying, "set up a conference with Jim, Dick,
   and either Keith or Tom at ISI sometime before five" These
   people would all see a request for a conference, would say when
   they expect to be available, and we'd all receive a prompt at
   the right time. If the topic of the confference had been
   announced in advance, all the documentation would be ready,
   indexes prepared, etc.   5a2

Formally coordinating things   6

   In a hierarchal organization such as the military (or any large
   business for that matter), one needs a capability for formal
   coordination and approval of actions. If I'm the boss and am
   expected to approve a proposed action, I want to know in a
   verifiable fashion that all the cognizant agencies have seen and
   approved it. I want to have all their commets appended in a

Thoughts on the Automated Office

reasonable fashion, and I want all the backup material available
in easily accessible form.   6a

Conversely, if I'm a staff officer trying to get something
approved, I'd like it swiftly and automatically forwarded to the
right people for coordination, I'd like to know at any time who
has acted upon the document and what they had done, and so on.
This type of thing is fundamentally different from the sort of
informal message-sending now going on over the network. If you
don't believe it, take a trip to the Pentagon some time. Of
course, I don't want to have to remember the names of all the
agencies and people who have to act on something. The system
should know my organizational structure and know what I'm dealing
with, and know who has to see what.   6b

Formally transmitting coordinated documents for approval   7

We need some substitute for the hand-written signature. As long
as we still have to keep signed documents on file somewhere, we'll
never get away from paper. This implies really good security plus
a separate audit function which can trace everything that has
happened to every file purporting to have originated with an
individual and verifying that he alone really did it. Perhaps we
need a fingerprint reader on every terminal.   7a

Intelligent aid   8

Looking over these rambling thoughts, I find that the word
"intelligent" occurs quite frequently. I think that's
surpassingly important. As Feigenbaum remarks, the thrust of
computer science is to move away from "how" to do things to deal
more directly with "what" we want to do. If we simply build a
workshop by indefinitely expanding the set of things we know "how"
to do, then we must correspondingly expand the set of specific
commands used to control these functions. This way lies madness   8a

Instead, I think we should aim from the outset to enable people to
communicate with their computer assistant in the only language
which -- by definition -- is capable of describing anything people
want or know how to do -- English itself. This represents the
only conceivable stable environment which could attract people to
the computer workshop and keep them happy there. Thus, in
summary, I believe that we should explicitly aim at a highly
intelligent, English-speaking super-secretary that doesn't just
know how to do a few things surpassingly well and learns new
things suddenly, but rather knows how to do everything rather
clumsily but learns to do them better in time.   8b

Thoughts on the Automated Office

(J20808) 7-DEC-73 13:04;   Title: Author(s): John S. Perry/JSP;
Distribution: /DCE JCN RWW JCRL; Sub-Collections: NIC; Clerk: JSP;
Origin: <ARPA>OFFICEWORK.NLS;1, 30-NOV-73 14:30 JSP ;

trial

contradictions have been alledged in our description of the elephant. 1

the review meeting will be at 3:00 2

a recurcive redefinition plan should imerge. 3

only wise, blind men should attend. in the project room one can find
god. 4

trial

(J20809) 7-DEC-73 14:37;   Title: Author(s): Clayton A. Greer/CAG;
Distribution: /CAG; Sub-Collections: NIC; Clerk: CAG;
Origin: <UCSB>PRIME.NLS;1, 7-DEC-73 14:33 CAG ;

New Output Processor

The bugs in the output processor discovered by DHC and others having
to do with directives not working when following certain characters
(e.g., D.C.) and the directive ... working only part of the time have
been fixed (we hope) and the new output processor brought up. Please
direct any bugs in the bug fixes immediately to HGL or EKM and get a
gold star just like Dave Crocker   1

New Output Processor

(J20810)   7-DEC-73 15:20;   Title: Author(s): Harvey G. Lehtman/HGL;
Distribution: /SRI-ARC DHC(thank you for finding one of the more obscure
OP bugs.) NDM(font types Spectra-- 7-- and Messenger-- 8-- will be in
sonn as we get character table . Modify documentation.);
Sub-Collections: SRI-ARC; Clerk: HGL;