'Proposal for Research No. ISU 74-132
Development Support NSW

SUBJECT:

NATIONAL SOFTWARE WORKS DEVELOPMENTS

1

SUMMARY: 2

This proposal by the Augmentation Research Center (ARC) of SRI covers tasks for the National Software Works Program (NSW). 2a

The National Software Works Program has as its goal the creation of an ARPANET based resource sharing framework into which tools can be embedded that aid each phase of the software system development process. Its framework is designed to promote the easy integration and coordination of new tools and the gradual strengthening of their cooperation into a unified system [1,2,3]. (References are listed at the end of Part One of this proposal.) 2b

The tasks proposed here are of two main types: tasks that assist in the creation of the NSW ARPANET-based system framework, and tasks that provide initial tools for the NSW environment. 2c

There are four main components of the NSW system: 2d

1) An NSW Frontend System (frontend) that will provide terminal access to the ARPANET and provide a set of services that will create a coherent NSW user environment. 2d1

2) An NSW Works Manager that will provide special services such as authentication, record keeping, file system, resource interconnection and file transfers, management aids, and so forth. 2d2

3) Protocols and conventions needed between the frontend and Works Manager, frontend and tools, and Works Manager and tools. 2d3

4) The tools (computers and software) that will reside in the NSW environment. 2d4

ARC is proposing the following tasks: 2e

System Framework Tasks 2e1

1) Design and implementation of the NSW Frontend system. 2e1a

2) prime responsibility for the management of the development of protocols needed by the NSW system. It is assumed that collaboration will be required with other NSW contractors, and other ARPANET communities with similar protocol needs. Other NSW contractors are tasked to develop some of the required protocols. 2e1b

Tool Tasks 2e2

3) Enhancements to ARC's oNLine System (NLS) to make it an even more effective tool for the NSW environment. 2e2a

4) Software for a DEC PDP-11 needed to connect the Air Force Burroughs 3500 Computer at the Air Force Data Systems Design Center in Montgomery, Alabama, to the ARPANET. 2e2b

This latter task is proposed as optional and is costed separately in Part Two - Contractual Provisions. 2e2b1

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OBJECTIVES: 3

I. Design, implement, and document a new NSW Frontend System. This system is to function with the other parts of the total NSW system [2,3]. 3a

A DEC PDP-11 based frontend satellite computer system will be developed for use with the National Software Works software production facility. This system will generally sit between the user's terminal and the ARPA network, but can also be accessed from terminals connected to TIPs. A version of the system will also run on a PDP-10 TENEX system as well. This frontend system will interact with the user who is giving commands to the NSW Works Manager, or to some tool operating within the NSW environment. It will provide terminal control, aid the user in command specification, parse commands, and communicate with the appropriate resource(s). It will play an important role in providing the coherent user and unified system environment desired in the NSW system. 3a1

II. Take responsibility for the design, documentation and follow through of those protocols and conventions required to create the ARPANET resource sharing environment needed by the NSW system. 3b

In the past, responsibility for protocol development in the ARPANET environment was widely shared and on a voluntary basis. This approach, while having achieved a number of successes, has had some serious deficiencies due to the lack of prime responsibility and accountability. To achieve the goals of the NSW, many new protocols and conventions need to be developed (as described later), existing protocols need to be reexamined and possibly redesigned, and management control is needed in the form of scheduling, obtaining protocol approval, consulting, validation, and other tasks associated with protocol implementation. 3b1

III. Provide restructuring and enhancements to NLS to make it operate most effectively in the NSW environment. NLS will provide documentation, source code editing, and other services to the NSW user community. 3c

NLS will require some restructuring to operate with the NSW frontend and Works Manager in a fully integrated way. NLS is envisioned as the prime tool for documentation and source code creation within the NSW. NLS can provide additional services as well, since it is in itself a collection of tools. To meet the needs of the initial NSW user community of COBOL system developers, a number of enhancements are proposed to increase

its effectiveness in the NSW environment. Providing these special NLS enhancements is of prime importance to help COBOL programmers prepare and debug their source code files, to help both programmers and technical writers document the systems developed, and to assist clerical personnel in the input of material. A list of desirable modifications appears below in the discussion of the proposed work. 3c1

IV. (Optional Objective) Design, implement and document a DEC PDP-11 based software system to connect a Burroughs 3500 computer to the ARPANET in a manner requiring minimum modification to the 3500 operating system and extendable to other types of computers in the future. 3d

One of the initial tools to be placed in the NSW environment is a Burroughs 3500 computer at the Air Force Data Systems Design Center in Montgomery, Alabama. This computer is to be the target machine for software developed by the initial NSW user community. It is primarily a batch machine specialized for COBOL program development. Initial NSW studies concluded that this class of machine is most effectively attached to the ARPANET through a minicomputer. 3d1

BACKGROUND AND TECHNICAL NEED: 4

The NSW Problem 4a

The goal of the ARPA NSW Program is to improve the productivity of the DoD software system building process by making available to production DoD system building staffs (programmers, documenters, managers, others) in a coordinated fashion the types of advanced tools in fairly widespread use in the research community. The Air Force alone spends over one billion dollars a year on software developments. It is well known that software is unnecessarily costly [4]. One way to decrease the cost of the software development process is to make improved tools and methodologies available to software engineers, managers, documenters, and other people involved with the system building process [4]. An approach to making tools more widely available is to create a network based marketplace, providing a framework for commercial, government, and R&D organization developed products. The NSW effort aims to create such a marketplace and, while requiring new technology, is also seen as having a heavy technology transfer component. 4a1

The technical need is to provide a system framework within which classes of advanced and existing tools can intercommunicate within the ARPANET environment, to provide a coherent user environment that, to the extent possible, gives the user the feeling that he is dealing with a single unified system, and to choose and modify existing tools to better serve the production DoD programming community, initially chosen as those using COBOL as the implementation language. 4a2

There will be three classes of tools that must be accommodated within the NSW environment: existing tools that are not to be modified, tools that will operate within the conventions of the NSW environment and outside the NSW environment, and tools that will operate strictly within the NSW environment. 4a2a

Past Efforts 4b

Many tools have been developed to aid aspects of the software system building process. These tools are not, however, widely available to DoD software developers because they are usually restricted for use on one computer system, or exist within the R&D community and are not readily available in a form or environment compatible with the DoD software production

process. Further, the tools are often disjointed, and have serious incompatibilities and conflicting user conventions. 4b1

There are many cases of DoD projects investing heavily in tool development before launching on a project only to have these tools lost after the development effort or system life was complete. There is considerable experience to indicate that small teams of skilled software developers, well supported with software system building, documentation, and management methodology and tools, are superior to large, mediocre, and poorly supported groups [4]. 4b2

The advent of the ARPANET with its improvements in communication economies, and ability to enable communication and resource sharing between different manufacturers' and developers' equipment and software offers a significant new environment within which to tackle the above needs. 4b3

Reference 4 is an excellent overview of the present state of the software system building process and contains a number of main recommendations for research and development that are directly achievable either by the NSW system approach or within the environment that will be created by the NSW system. 4b4

As indicated below, ARC has extensive experience in working to develop a prototype coherent tool workshop for software engineering. ARC has focused heavily on this application area both because of its importance in its own right and as a vehicle to allow its system developers to use and test the concepts and system they have been developing. 4b5

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ACCOMPLISHMENTS: 5

The Augmentation Research Center at SRI has been actively pursuing research and development in areas central to the NSW program since 1962. Relevant recent references are contained in [6-16]. ARC has made many significant accomplishments during this period. These accomplishments, coupled with a staff highly experienced in the building, application, analysis, and personal use of NSW type technology, provide the basis for the important roles ARC is proposing to play in the NSW program. A list of some of the accomplishments follows: 5a

1) ARC has a history of quality software engineering and has been a leader in applying new software engineering tools to aid the system building process. Examples follow: 5b

a) Early development of a meta-compiler system and its extensive use in building high level system programming languages. 5b1

b) Use of high level system programming languages in system building. 5b2

c) Pioneered early use of the ARPANET resource sharing to convert from an XDS 940 to a DEC PDP-10 computer. 5b3

d) One of the first groups to recognize the merits of TENEX and to adopt it and pioneer its early use. 5b4

e) Extensive use of NLS text features for source code preparation, documentation, file and procedure linking, and maintenance. 5b5

f) Use of split screens and source language debugging facilities. 5b6

g) Development of a Command Meta-Language for high level specification of the user interface. 5b7

h) Use of modular design principles. 5b8

i) Pioneered, with Xerox-Parc, development of a new modular runtime linkable programming system, MPS, to be released in summer '74. 5b9

j) Introduction and use of extensive measurement facilities in TENEX and NLS. 5b10

2) A strong early lead in getting collaboration going on TELNET, File Transfer, Mail, Graphics, and other ARPANET protocols. One of the first users of the ARPANET in a resource sharing mode for software development and a developer of the Host-Host protocol. 5c

3) Early explicit recognition of the potential that online computer and communication technologies have (in areas outside of straight numeric or accounting computation) in enhancing the effectiveness and efficiency of managers, scientists, engineers, programmers, and their supporting staffs in their daily work. 5d

4) Early explicit recognition of the importance to system building of an integrated system of text handling and system building tools. 5e

5) Publication of over 25 reports and papers on NSW related topics. 5f

6) Demonstration--at large professional meetings (FJCC '68, ASIS '69, ICCC '72), to hundreds of visitors, and via film--of a working prototype system containing many core concepts and features of an NSW system. The FJCC '68 conference was the first to show the power of coupled screens, video terminals, multiple display windows, and multimedia techniques (computer output, video pictures and a voice link). 5g

7) Pioneered the two-dimensional text work that will play an increasingly important role in the NSW environment, and developed many highly interactive tools and concepts for working and browsing in an information space, such as view specifications, interfile links, split screens, cross file editing, integration of text and numeric computation. 5h

8) Pioneered input device and work-station design (video displays, mouse, keyset, desk, and workspace). 5i

9) Long experience in high quality formatted publication quality hardcopy, through line printers, typewriters, and COM. 5j

10) Pioneered the concept of an integrated coherent workshop of many office tools with a uniform user interface. 5k

11) Early experience in teleconferencing support between remote individuals and groups at coupled screens (possibly video projected). 5l

12) Considerable experience with online information management for an office or software project environment, such as memos and

correspondence, full text storage and retrieval, indexing, and cross linking. 5m

13) First with a comprehensive system for online message control, addressing, distribution, delivery, individual and group identification, cross linking, and indexing. 5n

14) Over one hundred thousand hours of hands-on console experience with the use of NSW type technology in daily work, both at ARC and out on the ARPANET. 5o

15) Recognition of the importance of integrating mechanisms for studying and facilitating technology transfer into the system building process. 5p

a) Early application experience with the Network Information Center. 5p1

b) Pioneered the establishment of a solid service with the NLS Tymshare operated Utility (OFFICE-1) for support of applications. 5p2

c) Establishment of training and other application support services. 5p3

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PROPOSED EFFORT: 6

NSW Frontend Development 6a

The core concepts in the NSW frontend will be based on the experience gained in the development at ARC of a Command Meta-Language (CML) System for NLS. The NSW CML system will, however, allow greater flexibility both in terms of the range of command languages that can be expressed in CML, and also the extent of individual tailoring and usage measurement that the system will allow. 6a1

Features of the frontend are discussed below: 6a2

User Features 6a2a

The NSW frontend will allow the user access to all of the facilities provided in the NSW. All commands to the Works Manager or to any tool must be given through the frontend. The frontend will provide the user with a range of tailorable command language disciplines. For example, it will allow the user to specify how much prompting he would like when using each tool. In addition, the user may request terse syntactic/semantic help when specifying commands or verbose conceptual help with any tool or the NSW system facilities. 6a2a1

The frontend will create a coherent user environment for the workshop of tools that the NSW environment will provide. It will provide a common set of principles and conventions for the various user interface features, command language, control conventions, and methods for obtaining help and computer aided assistance. 6a2a2

Creating a coherent user environment has two main implications. One, it means that while each tool domain within the NSW may have a vocabulary unique to its area, this vocabulary will be used within language and control structures common throughout the workshop. A user will learn to use additional functions by increasing vocabulary, not by having to learn separate "foreign" languages. Two, when in trouble, he will invoke help or tutorial functions in a standard way. 6a2a3

The frontend will provide a set of capabilities to accommodate both novice and expert users. 6a2a4

System Level Features 6a2b

Computer Hardware Selection 6a2b1

Hardware discussions to date indicate that the decision has been made to use an appropriately configured DEC pDp-11 system as the NSW frontend machine. ARC will aid in specifying the appropriate configuration. 6a2b1a

Multiuser Operating System 6a2b2

Alternative operating systems will be evaluated in conjunction with other NSW contractors, and a decision will be reached on which to use. 6a2b2a

ARPANET Protocols 6a2b3

The standard ARPANET NCP Program will provide primitives for communicating with other NSW processes over the ARPA network and should be included in the operating system. Other ARPANET protocols needed within the NSW environment will also be provided. Some of these protocol support processes will be provided with the operating system. Others must be developed. In particular, protocols must be designed and implemented for communication between the frontend and the Works Manager and NSW tools. These conventions must enable communication of commands and arguments from the frontend to the Works Manager and tools. The conventions must also enable tools or Works Manager to tell the frontend to prompt the user for additional information and describe changes in the displayed image. Frontend protocol development must be managed within the framework of total NSW protocol development. (See section on Protocols Development below). 6a2b3a

Operating System Interface 6a2b4

An operating system interface module will be implemented, consisting of a set of virtual operating system primitives. Use of these primitives will be converted to actual operating system calls. The goal here is to make the frontend as operating system independent as possible. This will enable the frontend to reside on both a PDP-11 and PDP-10 or be transferred to other equipment later. 6a2b4a

Command Language Interpreter 6a2b5

The Command Language Interpreter (CLI) will interact with the user to allow him to give commands to various NSW tools, the Works Manager, or other NSW facilities. The CLI must also be able to handle machine-oriented messages from NSW tools or the Works Manager and translate these messages to an appropriate man-oriented language form. The interpreter will run on either a DEC PDP-11 or PDP-10 (TENEX). 6a2b5a

It may also, depending on overall NSW system design, inform the Works Manager whenever the user attempts to access or create new files, save the user's commands for intervals between tool checkpoints (if the tool is capable of checkpointing its environment), allow the user to reissue old commands, allow the user to define and use command macros (abreviations) and interact with tools (upon user request) to "undo" the effect of commands where possible. 6a2b5b

The Command Language Interpreter is driven by two data structures, a Command Language Grammar and a User-Profile data structure, described below. These data structures are sent to the frontend either by the Works Manager or by the tool system as needed. The command language available to the user at a point in time is represented by the union of the grammars active at that point. 6a2b5c

Command Meta-Language 6a2b6

A Command Meta-Language (CML) for specifying the user interface will be developed. A compiler will be implemented to produce command language grammar data structures from the CML specifications. 6a2b6a

Command Language Grammars 6a2b7

A Command Language Grammar is a data structure that describes the command language for a tool or the NSW Works Manager. When the user changes tools, new grammars will be loaded from the Works Manager or tool, if necessary. 6a2b7a

User-Profile 6a2b8

A User-Profile is a data structure that is loaded by the frontend when the user is authenticated by the Works Manager. It may be unique to each individual user and it is used by the Command Language Interpreter to determine how it should interact with that user. This data structure controls such things as how much help or prompting a user receives when using a particular tool, what commands are available to this user, and other information tailoring the system to the user. The information in this data structure can be changed upon user request or adaptively by programs based on user behavior. Updates to the User-Profile must be reported to the Works Manager. 6a2b8a

Terminal Control 6a2b9

This component interfaces the Command Language Interpreter to the particular display or typewriter terminal being used. Displays can be used as typewriter terminals or as full two-dimensional devices. The Terminal Control contains primitives for subdividing display screens into rectangular windows and for allowing the user to select text displayed on a screen as arguments in commands to tools. 6a2b9a

At the time this proposal is being written, we do not know whether or not NSW displays have been selected for the initial users. If not, we would participate in their selection. 6a2b9b

Because certain classes of work that the users want to do within the NSW environment involve remote job entry to batch processing systems, it is also desirable that the frontend be able to handle devices, such as card readers and punches, line printers, and tape drives, as well as interactive terminals. 6a2b9c

Maintenance 6a2b10

The frontend systems will be maintainable, loadable, and (symbolically) debuggable from a remote timesharing (TENEX) system. The main features needed to support remote debugging are expected to be supplied with the operating system. 6a2b10a

Integration 6a2b11

The frontend system will be integrated into the complete NSW system. 6a2b11a

Documentation 6a2b12

The documentation to be provided will consist of: (1) an online user HELP Facility and command reference manual, and (2) system overview descriptions and well-commented source code listings. 6a2b12a

Protocol Development and Management 6b

As should be done for any large system built by many individuals or groups, the NSW will be designed and implemented as a set of interconnected program modules and processes, each constructed independently of the others by one or more individuals or groups. 6b1

Many implementation details of a module or process are basically of concern only to the implementers, and are influenced by a variety of factors, including the characteristics of the host on which it must run and the programming styles of its programmers. 6b1a

However, three characteristics of each module or process are of wider concern and must be rigidly specified and that specification adhered to: 6b1b

1) The module's or process' function. 6b1b1

2) The format of any data bases it requires as input or generates as output. 6b1b2

3) The manner in which the module or process is accessed by, and communicates with, other modules or processes. 6b1b3

The conventions that specify the above for a specific function are called a protocol. 6b1c

In the course of building the NSW, protocols must be specified that govern a number of areas (the need for additional protocols will no doubt be exposed during the course of the contract year). 6b2

The design of protocols for the NSW will be a shared responsibility with other NSW contractors roughly as described below. Management of the NSW protocol developments is an ARC responsibility and is described later. 6b3

Areas of ARC Prime Design Responsibility 6b4

1) The NSW is dependent upon the following existing Network protocols, some of which may require modification or replacement for NSW use: 6b4a

a) Host-Host Protocol 6b4a1

b) File Transfer Protocol 6b4a2

c) Telnet Protocol 6b4a3

d) Graphics Protocol 6b4a4

2) The format of the data base describing the Command Language Grammar for a tool. 6b4b

3) The format of the User-Profile data base. 6b4c

4) Handling displayed information on a multiwindow, two-dimensional display screen. 6b4d

The latter three areas are tasks associated with the development of the NSW frontend, but must be coordinated as protocol developments. 6b4e

Areas of Other Contractor Prime Design Responsibility, or Shared Responsibility With ARC 6b5

1) The use of tools (by the frontend, the Works Manager, and other tools). Final responsibility for tool selection for the initial NSW system must rest with the NSW Steering Committee. Prime responsibility for design of protocols between tools and the Works Manager rests with Massachusetts Computer Associates (MCA). The responsibility for the protocols between the frontend and Works Manager, and frontend and tools is shared by ARC and MCA. The following tools have been identified: 6b5a

a) One or more Batch (RJE) Processors 6b5a1

b) A Text Editor 6b5a2

c) A Message Facility 6b5a3

d) The programmer's Assistant 6b5a4

e) A Behavior Reporting System 6b5a5

f) A Project Management System 6b5a6

2) The interaction between a B3500 or 360 batch machine, its NSW minicomputer frontend, and the Works Manager. 6b5b

This task is related back to Host-Host protocol development (ARC responsibility) and to tool protocols (MCA and ARC responsibilities as above). 6b5b1

3) Interaction with the Datacomputer (MCA responsibility). 6b5c

Protocol Management Responsibilities 6b6

ARC will assume responsibility for the administration of NSW protocol development, and expects that responsibility to manifest itself in the following areas as funding permits: 6b6a

1) Management of the NSW protocol development process. In this role, ARC would serve as coordinator for NSW protocol development and, specifically: 6b6a1

a) Participate in the specification of (or, where necessary, specify) standards for protocols themselves and for their measurement and documentation. 6b6a1a

b) Participate in the initial identification of protocols and the ensuing allocation of design responsibility. 6b6a1b

c) Assure that the design process is preceded by a written statement of the protocol's use and character. 6b6a1c

d) Follow through on whatever process is established to get protocols approved by the ARPANET community for general implementation. 6b6a1d

e) Coordinate the implementation of NSW protocols. 6b6a1e

f) Schedule phase-overs to revised versions of protocols. 6b6a1f

2) Evaluate protocols and their implementations. In this role, ARC would subject protocols and their implementations to a program of regular evaluation and testing to identify design flaws or areas for improvement, and to determine the correctness and effectiveness of specific implementations. Specifically, ARC would: 6b6a2

a) Compare related protocols for possible duplication of function and suggest improvements. 6b6a2a

b) Investigate the feasibility of conducting theoretical analysis of protocols. 6b6a2b

c) Measure the frequency with which various protocol features are used and thus identify the areas that would most benefit from increases in efficiency. 6b6a2c

d) Periodically test specific protocol implementations for correctness and completeness, and provide certification of an implementation's status. 6b6a2d

e) Measure and evaluate the performance of specific protocol implementations. 6b6a2e

3) Maintain documentation for NSW protocol and implementation. In this role, ARC would collect or, where necessary, generate documentation for protocols and their implementations, and make available the information it obtains from its analysis of them. ARC would: 6b6a3

a) Publish protocol, documentation, and measurement standards. 6b6a3a

b) Tag published protocol documents with their official designation -- experimental, official, and so forth. 6b6a3b

c) Publish test and measurement results for specific implementations, noting their completeness, any idiosyncrasies or bugs they might possess, their performance, and their official designation. 6b6a3c

d) Maintain lists of protocol designers and implementers. 6b6a3d

e) Route externally contributed implementation critiques to the appropriate parties. 6b6a3e

f) Provide consulting services to new hosts. 6b6a3f

4) ARC would perform trial implementations and experiment with protocols as needed and resources permit. 6b6a4

NLS as an NSW Tool 6c

The modifications and enhancements described in this section are desirable for the NSW version of the NLS workshop. To maximize their usefulness, ARC will work closely with the NSW's potential users. Trial features can be added, tested in the field, and modified as experience is gained. One of the goals is to make NLS an example of a tool fully integrated into the NSW environment. Tasks are listed below in approximate order of priority as we understand the needs. 6c1

1) Complete the split of the NLS system into frontend (user interface control) and backend (execution) parts to increase efficiency and to take full advantage of the NSW environment. 6c1a

2) Complete the work necessary to bring up the new NLS that is now in use at ARC, as the standard system on OFFICE-1. This new NLS system is to be the basis for further development and use by NSW users. 6c1b

3) Perform those modifications to the NLS file system that may be necessary to integrate it most efficiently into the larger NSW file system and conventions; deal with problems of file transfer and use imposed by network bandwidth (this may involve partial paging of files across the network); consider modifications in the Datalanguage specifications to create the necessary features to handle NLS structured files. 6c1c

4) Package and provide NLS user interfaces of special interest to initial NSW users. 6c1d

a) Provide special user interface features to aid COBOL programmers in the preparation, study, and documentation of COBOL source programs. These features would provide shorthand ways to create source statements and program structuring, aid program online viewing and studying, and provide some simple syntax checking. 6c1d1

b) Provide a special user interface oriented toward the clerical worker involved in simple word processing activities who has no need for the complete richness of the general NLS system, 6c1d2

5) Provide preprocessing facilities for making NLS-created COBOL code, written and structured for the convenience of the programmer, satisfy the syntactic requirements of the particular destination COBOL compiler accessed through the Remote Job Entry facilities of the NSW Works Manager, 6c1e

6) Extend the current HELP system database for use with the COBOL programmer's and secretaries' interfaces, 6c1f

7) Interface the powerful formatting capabilities of the NLS Output Processor to work with the Linotron photocomposition device at Wright Patterson Air Force Base and provide other needed extensions to NLS facilities for document publication, 6c1g

Discussion of Above Tasks 6d

1) NLS Frontend/Backend Split 6d1

One important task that will remain unfinished at the end of the current ARPA contract is the reorganization of NLS into a "frontend" system that can reside on a minicomputer and perform the highly interactive tasks associated with command setup and feedback, and a "backend" system that resides on a TENEX and performs command execution. This task is important because: 6d1a

a) It allows the NLS system to fit nicely into the NSW environment that is expected to utilize a frontend system as described earlier, 6d1a1

b) It is estimated that such an organization can reduce the cost of NLS operation by about a factor of two. This decrease in usage cost is particularly important for the NSW program that will utilize NLS widely, 6d1a2

The reorganization that would take place would be such as to fully utilize the NSW frontend capabilities proposed above, 6d1b

It is worth pointing out that once a split has been completed between frontend and backend functions two important directions of evolution become open, 6d1c

a) Move the most commonly used editing and viewing functions to be co-resident with the frontend functions on a local minicomputer. This direction would lead to additional substantial cost-saving in usage of NLS. 6d1c1

b) Move backend functions to other computer systems, such as Multics or IBM 370 equipment. Given that the highly interactive frontend user interface functions are running on a minicomputer, other machines than a PDP-10 may be more appropriate for the backend functions. It should be a relatively straightforward task to move the backend functions to other systems. 6d1c2

2) Make the new version of NLS operational on the OFFICE-1 computer system. 6d2

Another essential task that will be incomplete at the end of the current contract is to make the new NLS system, now operational at ARC on an experimental basis, the standard NLS system at the OFFICE-1 NLS Utility. Involved here is: 6d2a

a) Completion of the evaluation and modification of new user features and command syntax. 6d2a1

b) Completion of the HELP database of online documentation. 6d2a2

c) Completion of debugging and quality assurance testing. 6d2a3

3) Integrate the NLS File System into the NSW File System 6d3

The NSW system-wide file system will be the responsibility of the NSW Works Manager. The Datacomputer is expected to play a central role in this system. 6d3a

The Datacomputer is planned for NSW use in such tasks as: 6d3b

a) A tertiary store for code and documentation. 6d3b1

b) A tool for a general information retrieval system used in, for example, the maintenance of a Program Library. 6d3b2

c) An information storage and retrieval component of a management control system. 6d3b3

A number of issues need resolution with respect to whether or not to store all files between sessions on the Datacomputer, or to store working material on storage media,

such as disks, close to tools, such as NLS, when the files are being primarily used with that tool. 6d3c

There are trade-offs in design complexity in NSW tools -- such as NLS and the NSW Works Manager vs required ARPANET and Datacomputer bandwidth -- that need to be considered. 6d3d

ARC would work with MCA (the contractor for the Works Manager, with prime responsibility for the NSW file system) to consider such trade-offs relative to use of NLS and determine what limitations in Datalanguage and Datacomputer implementations might impact on use of NLS in the NSW environment. ARC would make appropriate recommendations and make NLS file system modifications as needed to integrate properly into the larger NSW file systems environment. 6d3e

4) Package NLS Functions and User Interface Features; Interfaces for COBOL Programmers, Programmer Support Personnel, and Others 6d4

NLS, and in particular its display version, has been used primarily by its developers. These users are highly skilled and motivated. They use the system in varying amounts, up to eight or more hours per day, depending on their tasks. These users were screened for employment because of their interest in applying computer technology and their expected ability to feel comfortable, and contribute, in a highly computerized environment. 6d4a

The user population outside of ARC contains a wider mix of people with different tasks, motivations, skills, and attitudes toward interactive computer use. These users need to have the NLS command set and training packaged in various ways, to simplify learning, and to be more explicitly aimed at their tasks where appropriate. 6d4b

The user interface is currently implemented with a Command Meta-Language System (CMLS) that makes it easy to modify the interface, repackage the features for special functions, and tailor the interface to individual needs. The split of the NLS system into front (user interface) and back (execution) parts, possibly running on separate machines, increases the efficiency and usefulness of this design. A discussion of this split appears above. 6d4c

To meet the needs of individual or special groups of users we must clearly analyze and understand what problems they are having with the present versions of NLS and what

features or functions would solve these problems. This will require close interaction with selected users, production of modified interfaces, and trial use by users with the modified interfaces. 6d4d

NLS is a very powerful and rich system. This richness is very important for experienced users, but can be confusing to those less experienced. Packaging NLS into self-contained subsets might better meet the needs of users of various experience levels. The syntax and command vocabulary can be made to mesh more closely with the concepts and task vocabulary of selected user classes. 6d4d1

Two types of user interfaces of special interest to the NSW effort are those for COBOL programmers and for programmer support personnel. 6d4e

a) COBOL Interface 6d4e1

Characteristic problems encountered by COBOL programmers are: 6d4e1a

1) The misspelling of lengthy reserved words, paragraph and section names, and data identifiers 6d4e1a1

2) Insufficient comments for data definitions sections, and paragraphs 6d4e1a2

3) Inefficient data definitions 6d4e1a3

4) Excessive verbosity 6d4e1a4

5) Lack of program structuring conventions and enforcement for increased comprehension 6d4e1a5

6) The time consumed in submitting a job for compilation and execution, only to find some trivial syntax error or some undefined data element. 6d4e1a6

ARC proposes that it develop a COBOL programmer's interface to NLS that will allow the user to enter and edit COBOL source code with the following features: 6d4e1b

1) Under user control, automatically complete the spelling of COBOL reserved words while inserting COBOL source code 6d4e1b1

2) Automatically apply structure to the inserted source code 6d4e1b2

3) Help ensure syntactic correctness of the inserted source code 6d4e1b3

4) Attempt to use existing data definitions to 6d4e1b4

a) Provide spelling completion when requested 6d4e1b4a

b) Request new definitions and documentation when a new identifier is used by the programmer. 6d4e1b4b

Such an interface could be easily implemented in the Command Meta-Language version of NLS as a special grammar with execution functions that deal with the COBOL programmer's problems while imposing documentation standards. Details of such a COBOL programmer's interface will be coordinated closely with personnel at the Air Force Data Systems Design Center. Similar interfaces may be developed for other higher level languages. 6d4e1b5

b) Programmer Support Personnel Interface 6d4e2

A special simplified interface to NLS would be provided to handle the needs of clerical support staff. It could be available in an offline version, as well as an online version, to make most effective use of computer time. It would be designed to be usable by temporary clerical help with a minimum of training; it would be as self-teaching as possible. 6d4e2a

5) Preprocessing of Source Code Prepared for Remote Job Entry for COBOL Compilation 6d5

A Remote Job Entry (RJE) facility will be made available through the NSW Works Manager. This facility will allow the NSW user to, among other things, compile and execute his COBOL programs on various machines available within the NSW environment that provide the required RJE facilities. An NLS preprocessor would take the source code prepared by the NLS COBOL programmmer's interface and format it appropriately for further handling by the NSW Works Manager. 6d5a

6) HELP-Tutorial Databases and Other Documentation 6d6

NLS user documentation will exist in two forms: online and in appropriate hardcopy forms. 6d6a

Hardcopy documentation will exist in the forms agreed between ARC and ARPA, such as cue cards, introductory guides, scenarios, or more extensive user guides. 6d6b

Online documentation and HELP databases will exist with appropriate easy-to-learn methods of access and browsing. Some simple tutorial facilities may be available as required. 6d6c

More sophisticated NLS tutorial and HELP facilities can evolve in later NSW system versions. 6d6d

7) NSW Publication System 6d7

One of the important early uses of NLS will be to produce publication quality documents in hardcopy or microfiche. Features required for these functions will be packaged as a separately identifiable NSW tool. 6d7a

Enhancements to NLS to produce documents in selected DoD formats will be made as funding permits. 6d7b

The Output Processor, a powerful hardcopy text formatter used in conjunction with NLS, will be modified so that it can be used with the DoD's Linotron phototypesetter. This will allow NSW users to write documents using NLS and then format them for publication using the Linotron. The Output Processor now supports hardcopy terminals, line printers, and Comp-80 COM devices, which produce publication quality hardcopy as well as microfiche and microfilm. 6d7c

NSW Host Computer Connection (An Optional Task) 6e

The NSW Host Connection to the ARPANET will be a combination of hardware and software designed for communication with a specific host. The hardware will include a minicomputer that will perform the basic tasks needed for communication: generation and interpretation of the proper handshaking codes and ARPANET protocols, receipt of data and command streams from remote job entry stations and online terminals, and communication with the NSW Works Manager and other facilities. 6e1

In particular, the Host Connection must receive and process commands sent to it by the NSW Works Manager and subsidiary modules responsible for defining and validating requests for tool use and seeing that the requests are carried out. 6e2

Design Considerations 6e3

Hardware 6e3a

Connection software should run on the standard minicomputer chosen for the NSW frontend, probably a PDP-11, connected to the network through an IMP via an IMP-Host interface. 6e3a1

The minicomputer would connect, where possible, directly to a host's (high speed) data channel. 6e3a2

Where lease agreements or hardware incompatibility restrict direct connection, a special hardware interface to the channel could be supplied by the manufacturer of the host computer. This hardware could make the minicomputer look like a device known to the host. 6e3a3

An evaluation should be made as early as possible as to whether or not the Host Connection computer and frontend computer should be the same or separate machines. 6e3a4

Software 6e3b

The design should avoid modifications to the host computer's operating system, to as great an extent as is possible. Maintenance of such modifications is an endless and unrewarding chore and generally delays installation of new and desirable releases of the operating system. 6e3b1

In addition it would make the task of interfacing to

hosts with different manufacturers' hardware much more complex, and require a learning period for the implementors for each new operating system encountered as new hosts are added to the NSW. 6e3b2

An alternative is to make the minicomputer look like a device the host computer system already is programmed to handle. 6e3b3

The virtual device would not necessarily have to be the same for all hosts, although the connection software would probably be simplified if it were. 6e3b4

The device could appear to be a disk drive, tape drive, terminal, etc. Probably the easiest to generalize for a variety of hosts would be a terminal. However, an alternative should be made available to support hosts that offer only batch services and do not support terminals. 6e3b5

The data coming into the mini from the network, remote job entry stations, or terminals for processing and transmission to the host would include: 6e3b6

1) Files from other network hosts to be sent to the local host for storage, processing, local printing, etc. 6e3b6a

2) All types of text files. 6e3b6b

3) Pre-generated job control streams with pre-compiled object code to be run on the host. These data could come over the network from another host (e.g., Datacomputer), from a remote job entry station, or from the NSW Works Manager. 6e3b6c

4) Source code for a variety of compilers and assemblers that include job control data with it. 6e3b6d

5) Job control streams generated by the NSW supervisor. 6e3b6e

6) Job control and data streams from remote job entry stations. 6e3b6f

7) Messages and data coming from terminals, both through the network and from local connections. 6e3b6g

8) Messages, control data, and synchronization data coming from other hosts. An example is the Datalanguage interface. 6e3b6h

Data coming into the mini from the local host could include: 6e3b7

1) Files (source code, text, object code) to be transfered to another host for editing, compiling, or whatever. 6e3b7a

2) Messages, files, etc, to be sent to terminals, line printers, and any other device connected to the mini. 6e3b7b

3) Messages and data from terminals connected to the host. 6e3b7c

The software to process the data streams would operate under the chosen NSW PDP-11 operating system. The operating system should be the same as the one used for the frontend. In fact, it is possible that the frontend and the connection systems will run on the same machine. 6e3b8

The software should maintain all the status information necessary to reconnect to the host, the network, or the remote job entry station in event of the failure of any one of them. 6e3b9

Implementation 6e4

The system would have two major components. The first would be general for all hosts and include communication with the operating system and with the NSW. 6e4a

Additional modules in the general component would include processing of the general Network protocols: File Transfer Protocol, Remote Job Entry Server, Telnet, and any special protocols that may developed. 6e4b

The second component could be a table-driven code that depends on a data structure containing all necessary information about the local host. 6e4c

Initial implementation efforts should be directed towards getting the Burroughs 3500 at the Air Force Data Systems Design Center in Montgomery, Alabama, connected first to the Network and then to the NSW. 6e4d

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The system software should be maintainable and debuggable to as large an extent as possible from a remote timesharing system.

6e4e

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WORK STATEMENT: 7

NSW Frontend development (Version 1 to be operational by July 1975) as funding and best efforts permit. 7a

1) Evaluate and select a minicomputer operating system. 7a1

2) Design and implement a frontend system to operate on PDP-11 and PDP-10 computers that will have the following features: 7a2

a) Operating system interfaces. 7a2a

b) Display and terminal control. 7a2b

c) Appropriate ARPANET Protocols. 7a2c

d) Command Language Interpreter driven by Command Language Grammar and User-Profile databases. 7a2d

3) Design a formal language for specifying NSW tool user interfaces and implement a compiler for it to produce the grammar databases mentioned above. 7a3

4) Provide user documentation in the form of an online HELP database and Command language reference manual summary. 7a4

5) Provide system documentation in the form of a system design overview and well commented source code listings. 7a5

6) Integrate the frontend system into the larger NSW system. 7a6

NSW Protocol Development and Management 7b

The following task areas will receive effort according to priorities agreed on with ARPA as funding permits. 7b1

1) Specify and publish standards for protocols, protocol measurement, and protocol documentation. 7b2

2) Maintain and publish, for each protocol, a statement of its intended use and character, the names of its designers, and its current state. 7b3

3) Maintain and publish design documents, tagged with their current state. 7b4

4) Evaluate existing protocols for possible duplication of function and perform re-design, as needed. 7b5

5) Follow through according to ARPANET procedures to get designated protocols approved as official for general implementation. 7b6

6) Schedule protocol implementations and phase-overs. 7b7

7) Evaluate protocol implementations; publish completeness, correctness, and performance data; investigate the feasibility of theoretical analysis; and serve as a clearinghouse for externally contributed evaluations. 7b8

8) Develop techniques for monitoring protocol usage. 7b9

9) Provide consulting services to new hosts. 7b10

10) Perform test implementations and trials as needed. 7b11

NLS as an NSW Tool 7c

1) perform the necessary changes to NLS that will enable it to operate as a cooperating, bona fide NSW tool, with a grammar for the frontend system and an execution module running under TENEX. 7c1

2) Make the new NLS system now running at ARC the standard NLS system at OFFICE-1. 7c2

3) Specify, design, implement, and document a COBOL programmer's text editing interface and a secretary's interface. 7c3

4) Create an NSW publication tool by appropriately packaging and enhancing existing NLS capabilities. Interface NLS to the Linotron phototypesetter. 7c4

5) Study and integrate the NLS file system into the larger NSW file system, as needed. 7c5

6) Provide a preprocessor for source code to be submitted to the Remote Job Entry facility of the NSW Works Manager for compilation and execution of COBOL programs. 7c6

7) Provide appropriate online and hardcopy user documentation. 7c7

NSW Host Computer Connection (An Optional Task) 7d

1) Design, implement and document the NSW Host Connection system and test thoroughly for smooth interface to the NSW and

to the local host. Provide documentation at the system level in the form of a system overview and well-commented source code. 7d1

2) After study of host hardware and software, specify any additional hardware requirements and modification to Host's operating system. 7d2

3) Supervise the installation of the software at the Host site and testing of all phases of the system. 7d3

4) Determine whether the Host Connection hardware can and should be shared with that of the NSW frontend system. 7d4

5) Provide user documentation for local operating personnel as needed. 7d5

MILESTONES: 8

The project milestones below represent an initial estimate. More detailed milestones will be prepared for internal project control and will be available to ARPA if desired after the start of the contract. Dates are July 1,1974 to June 30,1975. 8a

NSW Frontend Development 8b

July 1 8b1

Task begins. 8b1a

August 1 8b2

Frontend PDP-11 configuration recommendations. Operating system choice made. Implementation language choice made. 8b2a

October 1 8b3

Command Meta-Language design complete. NSW display recommendations. Cross-net debugging and other tools needed for task completed. 8b3a

November 1 8b4

Terminal control module designed. 8b4a

December 1 8b5

Operating system interface completed. CML compiler completed. 8b5a

January 15 8b6

Terminal control module implemented on PDP-11 and PDP-10. Documentation begins. 8b6a

February 1 8b7

Command Language Interpreter, Version 1, running. 8b7a

April 1 8b8

First version of complete frontend system running. 8b8a

July 1 8b9

Version 1 for NSW release running and documented. 8b9a

NSW Protocol Development 8c

Milestones are difficult to specify for this task, because of its close interaction with other NSW contractors and ARPANET resources and somewhat open-ended consulting and evaluation nature. 8c1

July 1 8c2

Task begins. 8c2a

September 1 8c3

Last cut at specifying NSW protocols needed and issues that may require alteration of existing protocols. 8c3a

October 1 8c4

Draft designs for new protocols specified. 8c4a

November 1 8c5

Draft designs reviewed. Modifications to existing protocols recommended. 8c5a

NLS as an NSW Tool 8d

July 1 8d1

Task begins. 8d1a

September 1 8d2

Design for NLS frontend-backend split completed. 8d2a

October 1 8d3

NLS two fork split completed. New NLS released to OFFICE-1 and documented. 8d3a

November 1 8d4

NSW management begins discussion with ARC Applications Department to provide NLS service via an NSW frontend to initial NSW users. 8d4a

December 1 8d5

COBOL programmers interface designed. NLS file system changes to operate in full NSW environment determined. 8d5a

December 15 8d6

Secretarial interface specified. 8d6a

February 1 8d7

NLS grammar modified for NSW environment. version 1 COBOL programmers interface ready for initial trial use. Version 1 Secretary's interface ready for trial use. 8d7a

March 1 8d8

Linotron interface complete. COBOL and Secretary's interfaces initial trials complete. File system changes for NSW environment complete. 8d8a

May 1 8d9

second stage COBOL and secretary's interfaces complete. 8d9a

July 1 8d10

NLS integrated as running tool in NSW environment and documented. 8d10a

NSW Host Computer Connection (Optional Task) 8e

It is assumed that the FTP, NCP, and TELNET protocols are obtained with the operating system. 8e1

July 1 8e2

Task begins. 8e2a

August 1 8e3

Complete initial stage of problem study. 8e3a

September 1 8e4

Recommendation on whether or not frontend and Host connection machines should be the same machine or not, Design for B-3500 interface complete. 8e4a

November 1 8e5

Implementation of B-3500 interface complete. 8e5a

January 15 8e6

RJE server protocol design complete. 8e6a

March 1 8e7

RJE server protocol implementation complete. 8e7a

April 1 8e8

Works Manager interface design complete. 8e8a

May 15 8e9

Works Manager implementation complete. 8e9a

July 1 8e10

System integrated into NSW, and documented. 8e10a

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PERSONNEL: 9

Included below are biographies of personnel likely to be involved with the tasks proposed. In addition, ARC will be hiring two to three additional software personnel, and an additional technical writer. Other ARC staff will be called on as needed. 9a

REFERENCES: 10

(1) Robert Balzer (USC-ISI), T. E. Cheatham (HARV-10), Stephen Crocker (ARPA-IPT), Stephen Warshall (MCA). Design of a National Software Works. USC/Information Sciences Institute, Marina del Rey, California. ISI-RR-73-16. November 1973, 25p. NIC 19208. 10a

(2) Stephen Warshall (MCA), NSW Framework, MCA Proposal No. P-7-D01; Revised February 26, 1974. 10b

(3) Robert Balzer (USC-ISI), NSW Frontend, Working Paper, May 1974. 10c

(4) Jack Goldberg (Editor), Proceedings of the Tri-Service Symposium on the High Cost of Software, Held in Monterey, California, Stanford Research Institute, September 17-19, 1973. 10d

(6) Douglas C. Engelbart, William K. English, "A Research Center for Augmenting Human Intellect". In: AFIPS Proceedings, Fall Joint Computer Conference, Vol. 33, 1968. p.395-410. NIC 3954. 10e

(7) D. C. Engelbart. Intellectual Implications of Multi-Access Computer Networks. Paper presented at Interdisciplinary Conference on Multi-Access Computer Networks, Austin, Texas, April 1970. 12p. NIC 5255. 10f

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(12) Richard W. Watson, Some Thoughts on System Design to Facilitate Resource Sharing, 20 November 1973, 5p, J20391, 10k

(13) Donald I. Andrews, "Line Processor:-A Device for Amplification of Display Terminal Capabilities for Text Manipulation". In: Proceedings of the National Computer Conference, 1974, p.479-487, NIC 20184, 10l

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(15) D. C. Engelbart and staff of ARC (SRI-ARC), Computer-Augmented Management-System Research and Development of Augmentation Facility - Final Report, RADC-TR-70-82, April 1970, 268p, NIC 5139, 10n

(16) Augmentation Research Center, Stanford Research Institute, Online Team Environment: Network Information Center and Computer Augmented Team Interaction - Final Report, RADC-TR-72-232, 8 June 1972, 268p, NIC 13041, 10o

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11

I. ESTIMATED TIME AND CHARGES 11a

It is proposed that the work outlined herein be performed during a period of 12 months commencing 1 July 1974. 11a1

Pursuant to the provisions of ASPR 16-206.2, attached are a cost estimate and support schedules in lieu of the DD Form 633-4. Also enclosed is a signed form complete except as to the "Detailed Discussion of Cost Elements." 11a2

II. REPORTS 11b

The work proposed herein will result in three types of documentation. 11b1

1) Online user documentation for the systems and features proposed. 11b1a

2) Hardcopy user documentation, such as cue cards, to be agreed on with ARPA. 11b1b

3) A final report of the experience gained as appropriate. 11b1c

III. GOVERNMENT-FURNISHED EQUIPMENT 11c

The work proposed herein will require Government-Furnished Equipment (GFE). The equipment required is PDP-10 TENEX computer time on the ARPA-owned, but ARC-operated, computer facility between July 1, 1974, and December 31, 1974. Resources are required to support at least 8 ARC display terminals to be used simultaneously. ARC users should be able to get at least 35%-40% of the CPU cycles available to users during the normal working day (8:00 A.M. - 5:00 P.M., PDT) and access to the system in off hours as available. 11c1

After December 31, 1974, ARC will buy the PDP-10 TENEX time needed for its NSW tasks from the OFFICE-1 facility, since the machine operated at SRI by ARC will be moved by ARPA to another location. 11c2

IV. CONTRACT FORM 11d

Because of the nature of the work proposed, it is requested that any contract resulting from this proposal be awarded on a cost-plus-fixed-fee basis, as a modification to the NSW TENEX

Facility contract between SRI and RADC/ARPA resulting from SRI Proposal No. ISU 74-127. 11d1

V. ACCEPTANCE PERIOD 11e

This proposal will remain in effect until 1 August 1974. If consideration of the proposal requires a longer period, the Institute will be glad to consider a request for an extension of time. 11e1

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COST ESTIMATE FOR CORE PROPOSAL
FOR 12 MONTHS, STARTING 1 JULY 1974
1) NSW Frontend Development
2) NSW Protocol Development and Management
3) NLS as an NSW Tool

Personnel Costs			
Supervision			
Prof			
Clerical			
Total Direct Labor			$ 181,892
Payroll Burden @ 28%			50,930
Total Labor and Burden			232,822
Overhead @ 107%			249,120
Total Personnel Costs			$ 481,942
Direct Costs *			
Travel			$ 7,797
4 trips, Montgomery, @ $329	=	$ 1,316	
11 trips, Washington, D.C., @ $355	=	3,905	
3 trips, Boston, @ $389	=	1,167	
8 days subsistence in Montgomery @ $30	=	240	
22 days subsistence in Washington, D.C. @ $42.50	=	935	
3 days subsistence in Boston @ $38	=	114	
Auto Rental 8 days @ $15	=	120	
Computer Facility and Terminals *			$ 158,061
Materials and supplies			450
Communication			700
Consultation			2,100
Documentation			3,293
Total Direct Costs			$ 172,401
Total Estimated Cost			$ 654,343
Fixed Fee			52,348
Total Estimated Cost plus Fixed Fee			$ 706,691

* See Schedules that follow.

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COST ESTIMATE FOR THE OPTIONAL HOST CONNECTION TASK
FOR 12 MONTHS, STARTING 1 JULY 1974

Personnel Costs			
Supervision			
Prof			
Clerical			
Total Direct Labor			$ 17,368
Payroll Burden @ 28%			4,863
Total Labor and Burden			22,231
Overhead @ 107%			23,787
Total Personnel Costs			$ 46,018
Direct Costs *			
Travel			$ 2,666
4 trips, Montgomery, Ala.			
@ $329		= $1,316	
30 Days Subsist.@ $30**		= 900	
Auto Rental 30 days @ $15		= 450	
Computer Facility and Terminals *			$ 25,731
Communication			200
Documentation			799
Materials and supplies			50
Total Direct Costs			$ 29,446
Total Estimated Cost			$ 75,464
Fixed Fee			6,037
Total Estimated Cost plus Fixed Fee			$ 81,501

* See Schedules that follow.
** Computer system installation expected.

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COST ESTIMATE FOR ALL PROPOSED TASKS
FOR 12 MONTHS, STARTING 1 JULY 1974

Personnel Costs			
Supervision			
Prof			
Clerical			
Total Direct Labor			$ 199,260
Payroll Burden @ 28%			55,793
Total Labor and Burden			255,053
Overhead @ 107%			272,907
Total Personnel Costs			$ 527,960
Direct Costs *			
Travel			$ 10,463
8 trips, Montgomery, @ $329	=	$ 2,632	
11 trips, Washington, D.C., @ $355	=	3,905	
2 trips, Boston, @ $389	=	1,167	
38 days subsistence in Montgomery @ $30	=	1,140	
22 days subsistence in Washington, D.C. @ $42.50	=	935	
3 days subsistence in Boston @ $38.00	=	114	
Auto Rental 38 days @ $15	=	570	
Computer Facility and Terminals *			$ 183,792
Communication			900
Consultation			2,100
Documentation			4,092
Material and Supplies			500
Total Direct Costs			$ 201,847
Total Estimated Cost			$ 729,807
Fixed Fee			58,385
Total Estimated Cost plus Fixed Fee			$ 788,192

* See Schedules that follow.

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SCHEDULE A
DIRECT LABOR

Direct labor charges are based on the actual salaries for the staff members contemplated for the project work plus a 4% judgmental factor of base salary for merit increases during the contract period of performance. The precise factor applied is dependent on the estimated period of performance. Frequency of salary reviews and level of merit increases are in accordance with the Institute's Salary and Wage payment policy as published in Topic No. 505 of the SRI Administration Manual and as approved by the Defense Contract Administration Services Region.

SCHEDULE B
OVERHEAD AND PAYROLL BURDEN

These rates have been found acceptable by the Department of Defense for billing and bidding purposes for the calendar year of 1974. We request that these rates not be specifically included in the contract, but rather that the contract provide for reimbursement at billing rates acceptable to the Contracting Officer, subject to retroactive adjustment to fixed rates negotiated on the basis of historical cost data. Included in payroll burden are such costs as vacation, holiday and sick leave pay, social security taxes, and contributions to employee benefit plans.

SCHEDULE C
TRAVEL COSTS, COMMUNICATION, MATERIAL AND SUPPLIES

Travel

Air fare is based on prices for travel to Washington D.C. at $355, to Montgomery, Alabama, at $329, and to Boston at $389, round trip tourist, established in the Official Airline Guide dated April 1, 1974.

Domestic subsistence rates and travel by private auto are established standards based on cost data submitted to and approved by DCAA.

Communication

This is an engineering estimate of the toll charges for

telephone calls during the period or performance.

Materials and Supplies

This is an engineering estimate of the cost of materials and supplies based on previous experience with similar projects.

SCHEDULE D
CONSULTANTS

Although the individuals have not yet been selected, it is anticipated that consultation services will be required in this project. The estimated amount is based on seven days of consulting at a rate of $300 per day.

SCHEDULE E
DOCUMENTATION COSTS

Report costs are estimated on the basis of the number of pages of text and illustrations and the number of copies of reports to be produced, in accordance with the following rates per page which have been reviewed by DCAA:

Editing	$2.29
Composition	2.22
Coordination	.63
Proofreading	.92
Illustration	19.14
Press and Binding	.021 per impression

The following is a breakdown of the estimated cost of report production:

Printing, 473 pages at $ 6.06 per page = (including editing, composition, report coordination, proofreading)	$ 2,865
Illustrations, 40 @ $19.14 =	767
Press and bindery at, 21,900 printed pages @ $ .021 per printed page =	460
Total Estimated Documentation Costs	$ 4,092

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SCHEDULE F
COMPUTER SUPPORT COSTS

1) PDP-10 TENEX Computer Time

a) July 1, 1974 to December 31, 1974	GFE
b) January 1, 1975, to June 30, 1975	
5.5 job slots for 6 months *	
16,765 x 5.5 =	$ 92,208

2) PDP-11 Systems

a) Equipment (lease)

1) PDP-11 Development Machine	
$1,531/mo x 12 =	18,372
2) Parity Memory add-on costs	
$500 + ($438.06/mo x 6) =	3,128
3) Network Interface =	11,050
4) PDP-11 Terminal access to ARPANET,	
$1278/mo x 6 =	7,668
5) Special cables, hardware, etc,	
$2,000 (estimated) =	2,000

b) Maintenance (16 hrs/d, 5 d/wk)

1) DEC PDP-11,	
$500/mo x 18 =	9,000

3) Terminals

a) NLS workstations (7)

1) Display (7)	
$233/mo x 7 x 10 =	16,310

b) TNLS Terminals

1) TI (incl maintenance) (4)	
$165/mo x 4 x 12 =	7,920
2) Maintenance, owned TI's (8)	
$20/mo x 8 x 12 =	1,920
3) Acoustic couplers (8)	
$16/mo x 8 x 12 =	1,536

c) Modems

1) Dial-up (7)
$36/mo x 7 x 12 = 3,024

d) Leased lines

1) DIA, data
$366/mo x 12 = 4,392
2) DIA, voice
$22/mo x 12 = 264

4) Tasker Display System (10 units for 3 mo)

a) Parts (estimated) = 3,000

5) Miscellaneous (estimated) = 2,000

Subtotal (Items 2-5)	$ 91,584
Total (Items 1-5)	$183,792

* UTILITY COMPUTER SUPPORT SUBCONTRACT COSTS:

The estimate given here is based on current costs as shown in SRI Proposal No. ISU 74-69, dated 26 April 1974. It is expected that costs as of January 1, 1975, will be about 20% lower. Cost per slot for 6 months estimated to be $16,765.

The estimate of the need for 5.5 Job Slots is based on experience at ARC on the number of console hours used by programming, documentation, and management people.

'Proposal for research No. ISU 74-132
Development Support NSW

'Proposal for Research No. ISU 74-132
Development Support NSW

1 JULY 1974
SRI-ARC 23352

Proposal For Research
SRI No. ISU 74-132

NATIONAL SOFTWARE WORKS DEVELOPMENTS

part One---Technical proposal

Prepared for:

Information Processing Techniques Office
Advanced Research Projects Agency
1400 Wilson Boulevard
Arlington, Virginia

Attention: Stephen D. Crocker

Prepared by:

Richard W. Watson,
Assistant Director
Augmentation Research Center

Approved:

Douglas C. Engelbart, Director
Augmentation Research Center

Bonnar Cox, Executive Director
Information Science and Engineering Division
Stanford Research Institute

'Proposal for Research No. ISU 74-132
Development Support NSW

1 JULY 1974
SRI-ARC 23352

Proposal For Research
SRI No. ISU 74-132

NATIONAL SOFTWARE WORKS DEVELOPMENTS

Part Two - Contractual Provisions

Prepared for:

Information Processing Techniques Office
Advanced Research Projects Agency
1400 Wilson Boulevard
Arlington, Virginia,

Attention: Stephen D. Crocker

&SRI-ARC 25-OCT-74 16:05 23352

'Proposal for research No. ISU 74-132
Development Support NSW

(J23352) 25-OCT-74 16:05;;;; Title: Author(s): Augmentation Research Center /&SRI-ARC; Distribution: /DCE([INFO-ONLY]) RWW([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: MEJ; Origin: < WATSON, NEWNSW,NLS;52, >, 2-OCT-74 16:58 RWW ;;;; ####;

DVN 12-JUN-74 11:49 23356

Need to Begin Translation of <NLS> Syntax into HELP Syntax.

Assuming Dick is willing to commit us to generating syntax both for HELP and to serve as the basis of command summaries directly from CML, a useful next step would be to look at (NLS,syntax,) and make a list of the translations that we feel should take place to make what is writen there helpful to useers of help. I could make such a list, but you, Jeanne, migt be a better person. Let me know your thoughts. 1

DVN 12-JUN-74 11:49 23356

Need to Begin Translation of <NLS> Syntax into HELP Syntax.

(J23356) 12-JUN-74 11:49; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /JMB([ACTION]) DIRT([INFO-ONLY]) ; Sub-Collections: SRI-ARC DIRT; Clerk: DVN;

KEV 12-JUN-74 12:41 23357

boulder conference

Dear jim,
Neither charles nor myself will be attending the conference in Boulder. Given our current situation here at ARC, we cannot justify the trip. However, that does not mean we are not interested in what goes on and will be looking forward to any progress that takes place.
Have a good conference.
Ken Victor

1

KEV 12-JUN-74 12:41 23357

boulder conference

(J23357) 12-JUN-74 12:41; Title: Author(s): Kenneth E. (Ken) Victor/KEV; Distribution: /JCM([INFO-ONLY]) CHI([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: KEV;

SRL 12-JUN-74 14:06 23358

Response to Feedback Received as of 6/12/74

Specifically addressed are JHB, RLL, KIRK, DCE, and DVN. If you havn't used the Userprogram inmes in NEWNLS yet you might want to read the section addressed to 'Everyone'.

Response to Feedback Received as of 6/12/74

Response to feedback received as of 6/12/74 1

Bugs listed below as fixed, are fixed in XNLS and will be a part of the running system probably by the end of the week. 1a

For other lists of fixed bugs and answers to questions see, (23214,) (23019,) (22973,) (22915,) (22896,). 1b

Everyone - 1c

A few people have had trouble with the new inmes program - in case you havn't tried it yet here's what to expect. 1c1

After typing (G)oto Subsystem (P)rograms<CA>
(L)oad (P)rogram inmes<CA> 1c1a

you will get the message "WARNING - no entry to program" and then "Subsystem inmes attached"; then proceed as follows: 1c1b

(G)oto Subsystem (M)essage<CA> 1c1c

(I)nsert and the rest should be self-explanatory 1c1d

Jim Bair - 1d

ref: (23129,) At present the command will work only if you specify the file as your last option. 1d1

Robert - 1e

ref: (23283,) Moving character nowhere probably has the lowest priority for being fixed. Don't hold your breath or move a character nowhere! 1e1

ref: (23322,) This bug is not repeatable (runaway system) and was probably a core dump problem or some weird thing. If it happens again, note whether you had received any prior error messages or were getting a core dump etc. 1e2

ref: (23323,) Your problem with file return ring and address return ring happens periodically and is a mystery - however, being worked on. 1e3

ref: (23312,) Jump next works even when there is no next. 1e4

ref: (23306,) Show file marker list works. 1e5

ref: (23218,) Jump File Return works 1e6

Response to Feedback Received as of 6/12/74

ref: (23120,) The return stack does work as advertised, in TNLS before trying it, it would probably be a good idea to do a Show file return stack to know how many .fr's to do. 1e7

ref: (23078,) ^O should now work in Copy and Show Directory commands 1e8

Kirk - 1f

ref: (23297,) @ is now a valid character in statement names 1f1

ref: (22987,) CR and LF should now work in links 1f2

ref: (22938,) Set name delimiters and default directory for links and markers should all work even on unlocked files. 1f3

ref: (23167,) The feedback directory was set up to allow write access only when you were connected to the directory. It has been changed to allow anyone in the directory group to have write access whether connected or not. 1f4

ref: (23169,) You should now be able to jump to return to a place arrived at by a tab. 1f5

ref: (23187,) Jump to return should not take you to an old version any more. 1f6

Doug - 1g

ref: (23313,), (23300,) and (23216,) - Your CONAN program should now remain instituted 1g1

Dirk - 1h

ref: (23225,) Set Case Mode First should now work in XNLS. 1h1

SRL 12-JUN-74 14:06 23358

Response to Feedback Received as of 6/12/74

(J23358) 12-JUN-74 14:06; Title: Author(s): Susan R. Lee/SRL;
Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: SRL;

KIRK 12-JUN-74 16:47 23359

Whole Universe Catalog seminar postponed

So that demo energy can be channeled toward the office of naval research this week, the WUC seminar has been postponed until next week. Time to be announced. 1

KIRK 12-JUN-74 16:47 23359

Whole Universe Catalog seminar postponed

(J23359) 12-JUN-74 16:47; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: KIRK;

KIRK 1-JUN-74 03:58 23360

Bug in number of lines on the screen after a horizontally split window.

There is one less line on the screen after splitting the window horizontally in the experimental system. In what I'm doing, this forces me to stop and reset. 1

KIRK 1-JUN-74 03:58 23360

Bug in number of lines on the screen after a horizontally split window.

(J23360) 1-JUN-74 03:58; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /BUGS([ACTION]) ; Sub-Collections: SRI-ARC BUGS;
Clerk: KIRK;

KIRK 31-MAY-74 13:59 23361

Suggestion concerning Help structure, technical terms, and default introductory views

I suggest that the Help database be structured in a way potentially meaningful to the user as suggested in <feedback, fdbk, future !help !db>. This is to avoid problems such as those documented by several people at the address in the link above. In order to accomplish this, I think the following database rules should be observed: 1

1. The substructure of any node (menued items) should be made up only of items classified by that node and that form a contiguous set of entities in a discernable order, 1a

For examples, look at: 1a1

<docuMENTATION,heLP,link>
<docuMENTATION,heLP,fileaddress>
<docuMENTATION,heLP,infileaddress>
<docuMENTATION,heLP,information>
<docuMENTATION,heLP,command> 1a1a

2. Any terms used to reference concepts in the node's description or "definition" should be either links within the text of the node or else "Show also" words. The destinations of these references should be descriptions in the help database located in sets with other descriptions of their kind structured as above, 1b

3. Any special initial views of the Help Database should be in branches structured for that purpose, 1c

For instance, a special "Goto Help" branch could be constructed containing only hardcopy, secretarially oriented words and descriptions interfacing this user to the more concise, online oriented information, 1c1

Currently the "Top" NLS concepts branch is trying to occomplish both the heiarchical classification of all the technical descriptions as well as the initial interface for technically naive secretaries. In my opinion, it is failing at both, 1c2

4. The six to eight line "limit" on the length of nodes should be relaxed to allow up to twenty lines if desired, 1d

To make a database formatted in this way most useable, 1) both the user and the database builder should have the capability of specifying MAP and FULL (verbose) views at any desired level of in interest, 2) the user should be able to choose links imbedded in a node. For example, both of these capabilities are available in the Whole Universe Catalog accessing system, 2

KIRK 31-MAY-74 13:59 23361

Suggestion concerning Help structure, technical terms, and default introductory views

(J23361) 31-MAY-74 13:59; Title: Author(s): Kirk E. Kelley/KIRK; Distribution: /DVN([ACTION]) FDBK([ACTION]) HGL([ACTION]) JMB([ACTION]) RWW([INFO-ONLY]) &DIRT([INFO-ONLY]) EKM([INFO-ONLY]) MDK([INFO-ONLY]) ; Sub-Collections: SRI-ARC DIRT; Clerk: KIRK;

KEV 12-JUN-74 09:50 23362

this is a copy of a letter I sent in response to E.N. Castrinakis' request for information. He is a senior systems analyst for Evaluation Technologies Inc.

KEV 12-JUN-74 09:50 23362

12 JUN 74 7:50PM

Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

E. N. Castrinakis
Evaluation Technologies Incorporated
Suite 1101
1701 N. Fort Meyer Dr.
Arlington, Va. 222209

Dear Mr. Castrinakis:

I've enclosed a copy of the paper on which I based by talk at the SICGRAPH/NBS Workshop on Machine Indepedent Graphics. I've also enclosed a copy of our most recent (although somewhat out of date) doecumentation on CML. 1

CML is currently fairly specific for our NLS needs, however, we do have plans to make it more general in the future. 2

If I can be of further assistance to you, please feel free to contact me. 3

Sincerely,

Kenneth E. (Ken) Victor
Augmentation Research Center

KEV 12-JUN-74 09:50 23362

(J23362) 12-JUN-74 09:50; Title: Author(s): Kenneth E. (Ken) Victor/KEV; Distribution: /RWW([INFO-ONLY]) DCE([INFO-ONLY]) JCN([INFO-ONLY]) CHI([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: KEV; Origin: < VICTOR, LET-2,NLS;1, >, 6-JUN-74 14:43 KEV ;

####;

KEV 12-JUN-74 10:45 23363

This is a copy of a letter I sent to Tom Sancha of the CAD project in England in response to a request for information I received at the SIGGRAPH/NBS Workshop on Machine Independent Graphics.

KEV 12-JUN-74 10:45 23363

12 JUN 74 7:51PM

Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

Tom Sancha
CAD Centre
Madingly Rd,
Cambridge, England

Dear Tom:

I've enclosed several pieces of documentation that you requested at the ACM-SIGGRAPH/NBS Workshop on Machine Independent Graphics.

The CML documentation is the most up to date documentation we have, however, it is slightly out of date. CML currently is fairly NLS specific, but we do have plans for making it more general in the near future.

The IMLAC documentation is current.

The NLS documentation is last years final report to ARPA. It describes last years version of NLS.

For more information about getting access to NLS via the network, contact Jim Norton here at ARC.

I would appreciate your sending me any descriptive documentation about GINO-F that you have available.

Sincerely,

Kenneth E. (Ken) Victor
Augmentation Research Center

(J23363) 12-JUN-74 10:45; Title: Author(s): Kenneth E. (Ken)
Victor/KEV; Distribution: /RWW([INFO-ONLY]) CHI([INFO-ONLY])
JCN([INFO-ONLY]) DCE([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: KEV; Origin: (VICTOR, LETTER,NLS;1,), 10-MAY-74 11:21
KEV ;
####;

SRL 4-JUN-74 14:07 23364

Mispelled word in Help

In INFILEADDRESS, menu is spelled menue 1

SRL 4-JUN-74 14:07 23364

Mispelled word in Help

(J23364) 4-JUN-74 14:07; Title: Author(s): Susan R. Lee/SRL;
Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC; Clerk:
SRL;

SRL 4-JUN-74 15:48 23365

Inconsistency in Sendmail

It seems a little inconsistent that when in Sendmail and you want to show status, you type "SH" and you get Show Status when anywhere else you would have to type "SHS" for (SH)ow (S)tatus, 1

SRL 4-JUN-74 15:48 23365

Inconsistency in Sendmail

(J23365) 4-JUN-74 15:48; Title: Author(s): Susan R. Lee/SRL;
Distribution: /FDBK([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk:
SRL;

KIRK 7-JUN-74 03:04 23366

Content analyzer in link bug

When ever I try to jump to link on a link containing a content analyzer, I get the message "fst entry nonexistant" in both the running and experimental systems. For example, try <:;["Time"];>. A break point at caddexp shows the first and second pointers are pointing to illegal strings if that helps. I had intended using this necessary feature as an integrated part of the demonstration I have been asked to give this afternoon at 4:00. It worked fine tuesday night. NLS seems to be falling to pieces. Startup no longer works either. Very misterious..... 1

KIRK 7-JUN-74 03:04 23366

Content analyzer in link bug

(J23366) 7-JUN-74 03:04; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /BUGS([ACTION]) KEV([ACTION]) ; Sub-Collections:
SRI-ARC BUGS; Clerk: KIRK;

KIRK 8-JUN-74 21:57 23367

content analyzer seems to be working again!

no more "fst entry nonexistant" when I jump to link containing a content analyzer. 1

KIRK 8-JUN-74 21:57 23367

content analyzer seems to be working again!

(J23367) 8-JUN-74 21:57; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /BUGS([INFO-ONLY]) ; Sub-Collections: SRI-ARC BUGS;
Clerk: KIRK;

KIRK 8-JUN-74 22:27 23368

hatred for change in replace link implementation

A screen full of carefully thought out, irreproducable thought just vanished with the message: "ILLEGAL LINK" as I was using the Replace Link command. Total bummer. 1

KIRK 8-JUN-74 22:27 23368

hatred for change in replace link implementation

(J23368) 8-JUN-74 22:27; Title: Author(s): Kirk E. Kelley/KIRK; Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: KIRK;

KIRK 8-JUN-74 22:31 23369

inconsistancy in replace link command

when I say replace invisible, and type in a visible, my typein
doesn't disappear with the message ILLEGAL INVISIBLE. 1

KIRK 8-JUN-74 22:31 23369

inconsistancy in replace link command

(J23369) 8-JUN-74 22:31; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FDBK([ACTION]) KEV([INFO-ONLY]) ;
Sub-Collections: SRI-ARC; Clerk: KIRK;

RLL 13-JUN-74 02:20 23370

Latest ONR movie script/scenario.

For the latest script/scenario for the ONR movie please see (lieberman,ONR,script;w). Comments are welcomed. I will appreciate them. Tape was sent to Palmer Films Wednesday and is expected back Thursday as a 16mm film. Robert 1

RLL 13-JUN-74 02:20 23370

Latest ONR movie script/scenario.

(J23370) 13-JUN-74 02:20; Title: Author(s): Robert N. Lieberman/RLL; Distribution: /DCE([ACTION]) JCN([ACTION]) JHB([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: RLL;

DVN 13-JUN-74 08:53 23371

Background References for Developement of the New Command Language.

Try (catalog,barcjtgoincnl,language:Dx). 1

DVN 13-JUN-74 08:53 23371

Background References for Developement of the New Command Language.

(J23371) 13-JUN-74 08:53; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /RLL([ACTION]) DIRT([INFO-ONLY]) ; Sub-Collections: SRI-ARC DIRT; Clerk: DVN;

RLL 14-JUN-74 01:04 23376

new show command for intrafile addresses,

How about a 'Show Return Stack ' command, Does the same as 'Show File Return Stack' command but for the intrafile stack,
A related suggested, but more complex I am sure , is to allow bugging of any of the items shown in either the Show return stack or show file return stack, the bugging would of course mean to jump to that spot, I guess an option after th list is shown would be OK/C: where C = Jump,

1

new show command for intrafile addresses.

(J23376) 14-JUN-74 01:04; Title: Author(s): Robert N. Lieberman/RLL; Distribution: /FDBK([ACTION]) JHB([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: RLL;

RWW 14-JUN-74 08:42 23377

When doing jump file retur I found that I could cycle through the file ring and the differrent nmes appear on the right but when you finally confirm you stay wher you are. 1

(J23377) 14-JUN-74 08:42; Title: Author(s): Richard W. Watson/RWW; Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: RWW;

SRL 14-JUN-74 09:54 23378

The Beginning of a Restaurant Guide

A pirated copy of Stanford Artificial Intelligence Labs restaurant guide, yumyum, is in my directory as both a text file and an NLS file under that name. A listing is also in my office on my table. For those who are interested this might be a good place to begin by adding our comments etc.

1

SRL 14-JUN-74 09:54 23378

The Beginning of a Restaurant Guide

(J23378) 14-JUN-74 09:54; Title: Author(s): Susan R. Lee/SRL;
Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: SRL;

JEW 14-JUN-74 10:52 23379

Remaining KFORK Display Problems?

Ferg-- Dean reports that my FTPFRK pgm, which uses KFORK, and which therefore zapped Tasker display info for the job, continues to do the same for the Line Processor. Was tasker code moved to RESET but not line processor code? Do you know what's happening? --Jim 1

JEW 14-JUN-74 10:52 23379

Remaining KFORK Display Problems?

(J23379) 14-JUN-74 10:52; Title: Author(s): James E. (Jim) White/JEW; Distribution: /WRF([ACTION]) NDM([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JEW;

KIRK 15-JUN-74 00:03 23382

Help, WUC, and the NAVY

Dick,

I haven't had a chance to work on Help at all this week because I got dragged into the NAVY demo. If I get pulled into that again the week after next as RLL plans, I don't think I will be able to keep up with Help. I was reluctant to take my week's vacation because only a few more weeks are necessary to get all of the basic HELP content written and get rid of all of the many current db bugs. I was hoping to get this stage done by July 1. 1

There is a person at SRI who knows more about video than I do, whose job at SRI is to make video tapes, who is the best half-inch video person I know of, and who is available. Robert Lieberman has the money to use him. I gave the name of this person (Phil Giesen) to Robert last month. I think Applications should use phil next time and let me get on with Help development. 2

As far as the ARC WUC seminar goes, so much unexpected red tape has grown in this area that I have decided not to give it. Arranging the same time ahead when you, Doug and Jim can all see it, discuss my plans for it and, more importantly, understand it and see the need for it, seems impossible. Maybe I could sit down with each of you individually at your convenience. I told point three weeks ago, that the WUC prototype would be available for viewing in two weeks. I must get in touch with them to set a time this coming week at the latest before it begins to look too bad. 3

KIRK 15-JUN-74 00:03 23382

Help, WUC, and the NAVY

(J23382) 15-JUN-74 00:03; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /RWW([INFO-ONLY]) JCN([INFO-ONLY]) DCE([
INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: KIRK;

JCN 15-JUN-74 11:58 23383

Preliminary Description of ARC Functional Roles and Staffing

For those Applications people who have an earlier version of parts of this document: I have made some additions since we discssed the earlier version

Preliminary Description of ARC Functional Roles and Staffing

The following set of notes -- starting with (2) below -- was discussed in the ARC Applications meeting held Friday, June 14. 1

The meeting was attended by those of our ARC staff who will be directly involved in the Applications activity (see--staff:xbz), with the exception of Robert Lieberman who was on travel status and Mark Beach who works other hours. Bob Ratner, an SRI man who will be a special consultant to Applications on a part-time basis, was also traveling. 1a

This first meeting was held primarily for the purpose of discussing the concept and nature of the ARC Applications activity, the functions to be performed and related roles and staffing, hopefully to encourage a new sense of team involvement for the group, and to add some perspective to this reorganization and expansion of what was formerly called "Operations" at ARC. 1b

There are several documents that we will prepare in the near future that will bring out the nature of the Applications effort. Some of these are: 1b1

The relationship of Applications to the ARC long-term AKW development program 1b2

The primary goals of Applications 1b3

The relationship of Applications to Development and Analysis at ARC and to other organizations to whom we will provide service 1b4

For each Applications functional role, a picture of its domain and plans for action 1b5

The Network Information Center as an Application 1b6

In view of ARC's plans for the coming year, Applications is entering a new phase where better understanding, organization and communications between people (and their functions) will really be of significant help to the group as we apply our efforts to the problems at hand -- and there are, as usual, many important challenges ahead. 1c

We plan to have periodic meetings to discuss what's going on and what's needed. These will be about every two weeks. In the interim, the special teams (see--special-teams:xbbgz) will meet separately to discuss their specific efforts. The initial set of teams is focussed on what appear (to me) to be three of the most pressing issues needing special team efforts. 1d

The following notes are only intended to be a starting point for

more development as we go along. There may well be some items missing or misplaced. As we make this picture clearer with more recorded and connected dialog, we will have a growing description of what Applications is all about. 1e

I would like to encourage further development of this framework through discussion and interlinking Journal items, referencing this document initially. 1f

Preliminary Description of ARC Functional Roles and Staffing

Applications Functional Roles Summary	Coordinator	2
Applications Management	Jim Norton	2a
Contract and Computer Service Supervision	Martin Hardy	2b
Documentation and User Interaction	xxx	2c
Hardware	Martin Hardy	2d
Liaison to Clients and Architects	Jim Norton	2e
Marketing	Mike Kudlick	2f
Marketing - ONR	Robert Lieberman	2g
NIC - Service	Jake Feinler	2h
SRI-ARC TENEX and Operators	Jeff Peters	2i
Secretarial	Sandy Johnson	2j
Software	Dave Hopper	2k
User Development	Jim Bair	2l
Consultants		2m
Special Teams		2n

Preliminary Description of ARC Functional Roles and Staffing

APPLICATIONS MANAGEMENT	Jim Norton	3
Coordination of all Applications activities		3a
Perform the usual SRI administrative functions for Applications		3b
Represent Applications on ARC Executive Management Committee (EMC)		3c
CONTRACT AND COMPUTER SERVICE SUPERVISION	Martin Hardy	4
Arranging for special communication facilities		4a
Expansion planning participation and negotiation		4b
Interaction with BBN on TENEX and Network performance		4c
Supervision of Client contracts - service and reports		4d
Supervision of SRI-ARC TENEX facility and service until January 1975		4e
Supervision of Tymshare contract performance and reports		4f
Monitoring computer service quality and use dynamics		4g
DOCUMENTATION AND USER INTERACTION	xxx	5
Assistance with giving users feedback on ideas/problems		5a
Processes and special services		5b
With superwatch and account-10: Prepare special reports for clients		5b1
Produce catalogs of Journal entries		5b2
Write user programs, check others' and maintain the user program library		5b3
Writing Proposals and reports		5c
Writing Utility Use Procedures (beyond NLS)		5d
Writing descriptions of the service(s)		5e
HARDWARE	Martin Hardy	6
Maintain Taskers and related SRI-ARC facility equipment,		6a

SRI-ARC terminal maintenance -	Rodney Bondurant	6b
Line processor maintenance until alternative service for users.		6c
Advise clients on hardware needs: terminals, communications facilities, printers, cassettes, etc		6d
Interact with BBN on TIP connections, modems, etc.		6e
LIAISON TO CLIENTS AND ARCHITECTS	Jim Norton	7
Development of Architects in methods and roles		7a
Detailed planning of organizational use with Architects		7b
Discussion of application strategies		7c
Discussion of organizational progress/problems		7d
Interaction with Architects - phone/display links, site visits		7e
MARKETING	Mike Kudlick	8
Arranging for special seminars/conferences		8a
Coordination of a set of broad Utility Policy statements on various questions - interaction with DCE/JCN		8b
Development of a set of marketing procedures - expansion plan		8c
Development of contact/intelligence files and procedures		8d
Development of marketing documentation and aids (slides, films)		8e
Interaction with interested clients coordinating with DCE JCN		8f
Advice on terminal and communication requirements		8f1
Discussing timing of subscription initiations		8f2
Communicating community concept and initial benefits of use		8f3
Discussing details of service and system features		8f4
Stimulating further interest in participation		8f5
Producing, presenting and followup on proposals		8g
NIC - SERVICE	Jake Feinler	9

Process information into online files:		9a
Directory		9a1
Resource files		9a2
Cross indexes		9a3
Produce hardcopy and distribute:		9b
Directory		9b1
Resource files		9b2
Cross indexes		9b3
In the process of carrying out the above, interact with the sites on the Network and with ARPA		9c
ARPANET News: coordination and production		9d
MARKETING - ONR	Robert Lieberman	10
Until January 1975, interact with ONR and potential Navy user-organizations in order to select initial applications and users who will be new Utility subscribers,		10a
See proposal (19938,)		10b
SECRETARIAL	Sandy Johnson	11
Assistance in text-input, file handling, usual office secretarial functions, assistance with special reports, use studies, property records, SRI interface activities		11a
SOFTWARE	Dave Hopper	12
NLS		12a
Coordinate the transfer of solid NLS systems		12a1
Keep the Journal system functioning properly		12a2
Feedback bugs other troubles to Development		12a3
Interact with User Development on user problems		12a4
Supervise the hardcopy service		12a5

Assist users with special NLS-based file problems 12a6

TENEX 12b

Train and advise Tymshare people in TENEX 12b1

Install needed new changes and features in TENEX 12b2

Help Tymshare debug Office-1 operational problems 12b3

Assist in facility expansion plans and implementation 12b4

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SRI-ARC TENEX AND OPERATOR FUNCTIONS Jeff Peters 13

Provide TENEX software functions (with assistance from Ken Victor) and coordination of the Operator staff: Mark Beach, Marcia Keeney, and two new Operators until January 1975 when the ARC TENEX is removed. 13a

USER DEVELOPMENT Jim Bair 14

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Negotiate with ARC Development (etc) for New NLS Features 14e

(for Clients, User Devel, Marketing, Liaison) 14e1

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CONSULTANTS Jim Norton 15

Bob Ratner (SRI-ISL) 15a

Assistance in business plan development with special attention to costing and pricing policies 15a1

More consultants will be added as needs arise 15b

SPECIAL-TEAMS	Jim Norton	16
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FACILITY EXPANSION NEEDS AND CONFIGURATIONS		16c
Applications Management:	Jim Norton	16c1
Contract supervision:	Martin Hardy	16c2
Marketing:	Mike Kudlick	16c3
Tymsare:	Edward Pollack	16c4

STAFF AND EFFORT APPORTIONMENT (very rough guess)

Staff: % of time ->	Office-1 Service	NIC	SRI-ARC Service	ONR	: Overhead	: Loanout
Bair	70	-	30	-	-	-
Beach	-	-	100	-	-	-
Bondurant	20	-	40	-	10	* 30
Feinler	-	100	-	-	-	-
Ferguson	40	-	60	-	-	-
Hardy	50	-	50	-	-	-
Hopper	100	-	-	-	-	-
Johnson	20	-	20	-	60	-
Keeney	-	-	100	-	-	-
Kudlick	20	-	-	-	80	-
Lee	60	-	10	-	-	* 30
Lieberman	-	-	-	60	20	* 20
Meyer to August	60	-	20	-	20	-
Norton	25	-	25	-	50	-
Peters	-	-	100	-	-	-
Ratliff	-	-	-	-	-	100 >
Ratner	-	-	-	-	50	-
VanDeRiet	-	-	-	-	-	100 >
new writer	30	-	-	-	70	-
new clerk NIC	-	100	-	-	-	-
new oper	-	-	100	-	-	-
new oper	-	-	100	-	-	-
borrowed ARC	50	30	-	30	-	-
Totals:(2160)	545	230	755	90	360	280

* = loanout to ARC development or Analysis efforts

Overhead includes essential activities such as:

750511	Administration and Planning
750521,22,23,25	Information Dissemination papers, SRI symposia/seminars, client liaison, program descriptions
750532	Institute Research and Development
750541-44	Staff Develoment Formal courses, Staff training Professional Society participation
750551	Staffing - interviews
750561-64	Facility Property records, equipment maintenance

[Note: Office-1, NIC, SRI-ARC, ONR headings above relate to client funding-support categories. SRI-ARC Development/Analysis will fund Applications in the sense that those activities will "buy" service from Applications, first using the SRI-ARC TENEX and after January 1, 1975 using the Office-1 TENEX.]

Preliminary Description of ARC Functional Roles and Staffing

(J23383) 15-JUN-74 11:58; Title: Author(s): James C. Norton/JCN;
Distribution: /SRI-ARC([ACTION]) ; Sub-Collections: SRI-ARC; Clerk:
JCN; Origin: (NORTON, ROLES.NLS;1,), 15-JUN-74 11:42 JCN ;

####;

Preliminary Description of ARC Functional Roles and Staffing

The following set of notes -- starting with (2) below -- was discussed in the ARC Applications meeting held Friday, June 14. 1

The meeting was attended by those of our ARC staff who will be directly involved in the Applications activity (see--staff:xbz), with the exception of Robert Lieberman who was on travel status and Mark Beach who works other hours. Bob Ratner, an SRI man who will be a special consultant to Applications on a part-time basis, was also traveling. 1a

This first meeting was held primarily for the purpose of discussing the concept and nature of the ARC Applications activity, the functions to be performed and related roles and staffing, hopefully to encourage a new sense of team involvement for the group, and to add some perspective to this reorganization and expansion of what was formerly called "Operations" at ARC. 1b

There are several documents that we will prepare in the near future that will bring out the nature of the Applications effort. Some of these are: 1b1

The relationship of Applications to the ARC long-term AKW development program 1b2

The primary goals of Applications 1b3

The relationship of Applications to Development and Analysis at ARC and to other organizations to whom we will provide service 1b4

For each Applications functional role, a picture of its domain and plans for action 1b5

The Network Information Center as an Application 1b6

In view of ARC's plans for the coming year, Applications is entering a new phase where better understanding, organization and communications between people (and their functions) will really be of significant help to the group as we apply our efforts to the problems at hand -- and there are, as usual, many important challenges ahead. 1c

We plan to have periodic meetings to discuss what's going on and what's needed. These will be about every two weeks. In the interim, the special teams (see--special-teams:xbbgz) will meet separately to discuss their specific efforts. The initial set of teams is focussed on what appear (to me) to be three of the most pressing issues needing special team efforts. 1d

The following notes are only intended to be a starting point for

JCN - Consider Questions for each - see people - set meeting dates. Start with plans for each - develop with them.

JCN: Make online Calendar + Affair with Johnson - She will remind + send out Notices 4C/within 3 DAYS IN ADVANCE.

<NORTON>roles (1)

more development as we go along. There may well be some items missing or misplaced. As we make this picture clearer with more recorded and connected dialog, we will have a growing description of what Applications is all about. 1e

I would like to encourage further development of this framework through discussion and interlinking Journal items, referencing this document initially. 1f

Preliminary Description of ARC Functional Roles and Staffing

Applications Functional Roles Summary		
Coordinator		2
Applications Management	Jim Norton	2a
Contract and Computer Service Supervision	Martin Hardy	2b
Documentation and User Interaction	xxx	2c
Hardware	Martin Hardy	2d
Liaison to Clients and Architects	Jim Norton	2e
Marketing	Mike Kudlick	2f
Marketing - ONR	Robert Lieberman	2g
NIC - Service	Jake Feinler	2h
SRI-ARC TENEX and Operators	Jeff Peters	2i
Secretarial	Sandy Johnson	2j
Software	Dave Hopper	2k
User Development	Jim Bair	2l
Consultants		2m
Special Teams		2n

Preliminary Description of ARC Functional Roles and Staffing

APPLICATIONS MANAGEMENT	Jim Norton	3
Coordination of all Applications activities		3a
Perform the usual SRI administrative functions for Applications		3b
Represent Applications on ARC Executive Management Committee (EMC)		3c
CONTRACT AND COMPUTER SERVICE SUPERVISION	Martin Hardy	4
Arranging for special communication facilities		4a
Expansion planning participation and negotiation		4b
Interaction with BBN on TENEX and Network performance		4c
Supervision of Client contracts - service and reports		4d
Supervision of SRI-ARC TENEX facility and service until January 1975		4e
Supervision of Tymshare contract performance and reports		4f
Monitoring computer service quality and use dynamics		4g
DOCUMENTATION AND USER INTERACTION	xxx	5
Assistance with giving users feedback on ideas/problems		5a
Processes and special services		5b
With superwatch and account-10: Prepare special reports for clients		5b1
Produce catalogs of Journal entries		5b2
Write user programs, check others' and maintain the user program library		5b3
Writing Proposals and reports		5c
Writing Utility Use Procedures (beyond NLS)		5d
Writing descriptions of the service(s)		5e
HARDWARE	Martin Hardy	6
Maintain Taskers and related SRI-ARC facility equipment.		6a

Assumed hardcopy supervision

More to Software ?

SRI-ARC terminal maintenance -	Rodney Bondurant	6b
Line processor maintenance until alternative service for users.		6g
Advise clients on hardware needs: terminals, communications facilities, printers, cassettes, etc		6d
Interact with BBN on TIP connections, modems, etc.		6e
LIAISON TO CLIENTS AND ARCHITECTS	Jim Norton	7
Development of Architects in methods and roles		7a
Detailed planning of organizational use with Architects		7b
Discussion of application strategies		7c
Discussion of organizational progress/problems		7d
Interaction with Architects - phone/display links, site Visits		7e
MARKETING	Mike Kudlick	8
Arranging for special seminars/conferences		8a
Coordination of a set of broad Utility Policy statements on various questions - interaction with DCE/JCN		8b
Development of a set of marketing procedures - expansion plan		8c
Development of contact/intelligence files and procedures		8d
Development of marketing documentation and aids (slides, films)		8e
Interaction with interested clients coordinating with DCE JCN		8f
Advice on terminal and communication requirements		8f1
Discussing timing of subscription initiations		8f2
Communicating community concept and initial benefits of use		8f3
Discussing details of service and system features		8f4
Stimulating further interest in participation		8f5
Producing, presenting and followup on proposals		8g
NIC - SERVICE	Jake Feinler	9

Process information into online files: 9a

Directory 9a1

Resource files 9a2

Cross indexes 9a3

Produce hardcopy and distribute: 9b

Directory 9b1

Resource files 9b2

Cross indexes 9b3

In the process of carrying out the above, interact with the sites on the Network and with ARPA 9c

ARPANET News: coordination and production 9d

MARKETING - ONR Robert Lieberman 10

Until January 1975, interact with ONR and potential Navy user-organizations in order to select initial applications and users who will be new Utility subscribers. Close collaboration with other Marketing efforts. 10a

See proposal (19938,) 10b

SECRETARIAL Sandy Johnson 11

Assistance in text-input, file handling, usual office secretarial functions, assistance with special reports, use studies, property records, SRI interface activities 11a

SOFTWARE Dave Hopper 12

NLS 12a

Coordinate the transfer of solid NLS systems 12a1

Keep the Journal system functioning properly 12a2

Feedback bugs other troubles to Development 12a3

Interact with User Development on user problems 12a4

Supervise the hardcopy service 12a5

2 move to documentation

Assist users with special NLS-based file problems 12a6

TENEX 12b

Train and advise Tymshare people in TENEX 12b1

Install needed new changes and features in TENEX 12b2

Help Tymshare debug Office-1 operational problems 12b3

Assist in facility expansion plans and implementation 12b4

Interact with BBN to work toward standard TENEX 12b5

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Assessment and analysis of user states (with Analysis help as appropriate) 14b

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Marketing:	Mike Kudlick	16b3
User Development:	Jim Bair	16b4
FACILITY EXPANSION NEEDS AND CONFIGURATIONS (FAC team)		16c
Applications Management:	Jim Norton	16c1
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Marketing:	Mike Kudlick	16c3
Tymsare:	Edward Pollack	16c4

New Idents: needed

Coord ARCAP – all ARC Applications people

RR CP – Costing + Pricing Policies team

MDK APP – Application Studies team

MEH FAC – Facility expansion and config. team

STAFF AND EFFORT APPORTIONMENT (very rough guess)

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Ferguson	40	-	60	-	-	-
Hardy	50	-	50	-	-	-
Hopper	100	-	-	-	-	-
Johnson	20	-	20	-	60	-
Keeney	-	-	100	-	-	-
Kudlick	20	-	-	-	80	-
Lee	60	-	10	-	-	* 30
Lieberman	-	-	-	60	20	* 20
Meyer to August	60	-	20	-	20	-
Norton	25	-	25	-	50	-
Peters	-	-	100	-	-	-
Ratliff	-	-	-	-	-	100 >
Ratner	-	-	-	-	50	-
VanDeRiet	-	-	-	-	-	100 >
new writer	30	-	-	-	70	-
new clerk NIC	-	100	-	-	-	-
new oper	-	-	100	-	-	-
new oper	-	-	100	-	-	-
borrowed ARC	50	30	-	30	-	-
	-----	-----	-----	-----	-----	-----
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(Note: Office-1, NIC, SRI-ARC, ONR headings above relate to client funding-support categories. SRI-ARC Development/Analysis will fund Applications in the sense that those activities will "buy" service from Applications, first using the SRI-ARC TENEX and after January 1, 1975 using the Office-1 TENEX.)

Make cost estimate - BEV
See each piece on monthly loaded
cost basis — so rearrangements are
easy.
figure % sold — % sold with
1/2 DCE + 1/2 hewitt.

KIRK 16-JUN-74 18:18 23384

Bug with statement return stack using ,fr in jump to link.

When returning to a file using ,fr in the experimental system, my statement return stack is forgotten. This happens without using split screens and seems related to the earlier problem of restoring viewspecs with ,r in a link. This bug keeps my user program from working properly and causes dissapointment in other circumstances as well.

1

KIRK 16-JUN-74 18:18 23384

Bug with statement return stack using .fr in jump to link.

(J23384) 16-JUN-74 18:18; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /BUGS([ACTION]) KEV([ACTION]) ; Sub-Collections:
SRI-ARC BUGS; Clerk: KIRK;

SRL 14-JUN-74 12:05 23386

MST Editor with the Secretary in Mind

I was cleaning off my desk today and found this file that I had been working on about 6 weeks ago. Although references to MST are out-of-date, the ideas might be of use when a system is designed for secretaries. Not knowing what I might be doing then, I thought I would journalize this in it's rough form.

MST Editor with the Secretary in Mind 1

INTRODUCTION 2

The following is a proposed set of specifications for a command language and file system which should be functional and easy to learn and use. It might very well be a subset of a larger system. 2a

This proposal is directed to the needs of a secretary and a discussion of the premises behind this proposal follow. 2b

The functions a secretary can accomplish online should be outlined to insure they may be easily accomplished through the use of the resulting MST system. 2b1

Observation of secretaries at the Augmentation Research Center (ARC) indicates that the online system (NLS) is used primarily for the following functions: 2b1a

1. Inserting and editing text for another person. 2b1a1

2. Writing and formatting letters. 2b1a2

3. Maintaining lists which must be frequently updated, and 2b1a3

4. Communicating with other people who have ARPANET access. 2b1a4

Donald Oestreicher in (18933,) describes secretarial functions with thoughts as to which may be accomplished with the aid of a computer system. 2b1b

1. Transformation of bulk information - greatly aided by online system 2b1b1

2. Acting as a communications interface - online system good for dealing with other online offices only 2b1b2

3. Administration of normal operations - if files are online 2b1b3

4. Arranging affairs - probably not, other than for reminders 2b1b4

5. Maintenance of morale - no 2b1b5

Currently in order for a person to input text, keep lists, or write letters using NLS, a comprehensive knowledge of NLS

is needed. This involves several days of class, several weeks to build proficiency and in the interim a disruption of work. In a busy office, it is no wonder that a secretary rebels against such an "innovation". 2b1c

Because of such experiences in the past, I am suggesting a system (or possibly a subsystem of a larger system) which will: 2b1d

1. Be easily learned and used 2b1d1

2. Easily and efficiently handle online secretarial functions 2b1d2

3. Be easily used on a typewriter terminal (as this is what most secretaries will probably have) 2b1d3

4. Have advantages over standard office machines (typewriter) and procedures 2b1d4

These proposals are by no means intended to be a reflection on the intelligence of the "average secretary". I think with changes to allow for the execution of different functions and for the availability of a CRT, a system of similar simplicity would be quite suitable for the managerial half of the MST system. 2b1e

DESCRIPTION 3

File Structure 3a

Rather than calling parts of structure: statements, branches, groups, or plexes, I think there should be two structural elements, headings and paragraphs with an option called indenting which could act on either the first line only or the entire structure. I believe there is no need for more than one "level" in most office applications and Indenting would handle one level. This belief could be confirmed by a study of documents produced by offices. 3a1

Command Structure 3b

Login 3b1

The login sequence should be more intuitive and interrogative if possible. 3b1a

One of the very first things a user learns to do on a system is log on and he/she should not be required to type a

sequence such as e21^c etc. If at all possible, one attention getting character should be necessary which would then be followed by a series of questions to complete the login operation. 3b1b

TENEX Maintenance 3b2

A review of Jim Bair's course outline (22656,) indicates that the following Tenex commands are taught: delete, continue, sndmsg, and readmail. 3b2a

If this is in fact true, then the entire Exec could probably be invisible to the user eliminating confusion over two command languages and possibly different command recognition modes. 3b2b

The new NLS command language allows execution of many Exec-level commands (all that are needed for file maintenance?) including deleting and copying files. 3b2b1

If people are allowed to be logged on all day, there would be little need for a groupstat or systat command. 3b2b2

I think it would be more intuitive to have one system for reading and one system for sending mail rather than learning both sndmsg and Sendmail. Both of these could also be part of the MST command language rather than in the Exec. 3b2c

One immediate problem would be disc space, but secretaries could be encouraged to delete files when they are no longer needed, to conserve space, and to keep track of the amount of space used. 3b2d

Text Insertion and Manipulation 3b3

Creating Files 3b3a

There are no doubt several alternatives to the current create file command. The one I favor presently would be of a functional nature so that a typist could say Begin Letter (invoking an interrogative letter program which would allow insertion of the body of the letter) or Begin Text. Ideally the user would be requested to insert a word identifying the letter or text and then without further user input, either allow text insertion to begin or interrogate the user for additional information. 3b3a1

Other functional possibilities could be added which would create a file as well as initialize other standard

parameters - such as invoking a program. (For more comments on the present letter program, see (analysis,notes,2d). 3b3a2

Viewspecs 3b3b

It would be best if viewspecs did not have to be dealt with in the beginning. One way to get around this would be to change default viewspecs from z to y and from n to m, Gm, Im, or IGm. I think most office applications would require blank lines between statements and at this point statement numbers are necessary for the editing commands to be described below. 3b3b1

Printing 3b3c

The simplest print command would be of the form: Print A: CA where printing would begin at the specified address and end at the end of the file or with a ^O interrupt. 3b3c1

A more complex print command might be more desirable. 3b3c2

Addressing 3b3d

The following types of addressing would be desirable: 3b3d1

1. Paragraph numbers - permanent numbers (like SID's) would probably be best to allow a user to reorganize a file on the basis of numbers which are not constantly changing. 3b3d1a

2. Beginning of statement (not after first character) or end of statement could be the default when inserting text. A command frequency study would help determine which address is most used. 3b3d1b

3. Content - enclosed in appropriate symbols - where text would be inserted FOLLOWING the last character of CONTENT 3b3d1c

4. Linking to other files 3b3d1d

Editing 3b3e

The commands listed are basically a subset of NLS commands with some syntactical changes. They were chosen after a survey of ARC secretary's TNLS editing habits. A TNLS command frequency study could be useful for corroborating these opinions. 3b3e1

Text 3b3e1a

1. Insert and Delete Paragraph (or Heading) A:
(paragraph # accepted) 3b3e1a1

2. Insert Text A: (paragraph number accepted) with default being at end of paragraph addressed. Special character required for insertion at beginning or CONTENT for insertion within paragraph. 3b3e1a2

3. Substitute text at A: (accept paragraph #)
NEW TEXT
FOR OLD TEXT etc.,
where a delete text is accomplished by typing a CR when you are interrogated for NEW TEXT. 3b3e1a3

Structure 3b3e1b

1. Move Paragraph (or Heading) from A: to A:
(paragraphs numbers accepted) 3b3e1b1

2. Copy Paragraph (or Heading) from A: to A:
(paragraph number accepted) 3b3e1b2

One other possibility would be a command set: Delete, Move, and Copy Section (or Branch), which would act on a heading plus all text until the next heading. 3b3e1b3

Updating 3b3f

Should probably best occur either upon logout or as a part of other functional tasks, such as journalizing. An update command would then be unnecessary. 3b3f1

Sending and Reading Mail 3b3g

One system, similar to the sendmail and readmail subsystems in the new command language should handle all correspondence. 3b3g1

An analysis of the sendmail-readmail subsystem will be included here once they are fully implemented and reasonably well debugged. 3b3g2

Formatting System 3b3h

If offices we deal with have any volume of report

production, consideraton needs to be given to a general purpose formatting system for accomplishing special formatting tasks. Any task which is repeatedly formatted in the same way could be accomplished through the use of a program (such as writing a letter). 3b3h1

The need for a formatting system is probably real, at least in a certain percentage of offices. If it were a truly independent subsystem, it could be introduced only to those people who required it and probably after they felt comfortable with the standard system features. 3b3h2

SRL 14-JUN-74 12:05 23386

MST Editor with the Secretary in Mind

(J23386) 14-JUN-74 12:05; Title: Author(s): Susan R. Lee/SRL;
Distribution: /RWW([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk:
SRL; Origin: (LEE, MSTEDIT.NLS;4,), 14-JUN-74 12:01 SRL ;####;

SLJ 17-JUN-74 09:14 23387

it's high time . . .

dear people: a pot-luck picnic goodbye party birthday party for paul, beau, mil, reddy, ken, ed sandy, dave, paul again, jim norton jeff, etc, etc, et al ad everything in the park next door, burgess i think it's called, bring whatever you like, if coordination is your idea of paradise, a piece of paper will occur outside my window. love, carmen, also love susan. 1

SLJ 17-JUN-74 09:14 23387

it's high time . . .

(J23387) 17-JUN-74 09:14; Title: Author(s): Sandy L. Johnson/SLJ;
Distribution: /SRI-ARC([ACTION]) ; Sub-Collections: SRI-ARC; Clerk:
SLJ;

mystic unmentionable

a pot luck picnic boodbye goodbye party birthday party for paul, beau, mil, reddy divley, ken, ed, sandy-carmen, paul again, james norton, jeff, andd everybody else who has had or will have a birthday or cosmic exit in the may, june, area, at about noon this friday, june 21, burgess park, bring what you really, really want to bring, something which to you is special, even if it isn't necessarily so for . . . well, you understand, don't you? if coordination matters to you, i will put a piece of paper up infront of my office . all that really matters is that maybe we can muster a little creativity. . . .love carmen-sandy, and susan blue eyed. 1

SLJ 17-JUN-74 09:31 23388

mystic unmentionable

(J23388) 17-JUN-74 09:31; Title: Author(s): Sandy L. Johnson/SLJ;
Distribution: /SRI-ARC([ACTION]) ; Sub-Collections: SRI-ARC; Clerk:
SLJ;

WRF 17-JUN-74 16:45 23390

Notes of the TENEX Advisory Committee Meeting

Of interest to the Davy Crocketts of the TENEX Frontier.

Notes of the TENEX Advisory Committee Meeting

Introduction 1

This was the first meeting of the TENEX Advisory Committee (hence forth known as TAC). It was held at ISI on June 12. The people in attendance were Bert Sutherlnd - chairman (from BBN), Gail Hedtler (BBN), Tom Boyington (ISI), Dan Lynch (SRI-AI), Marty Morris (CCA), a representative from Carnegie, and myself. Our goals were: 1a

a) to write a charter for ourselves (see Appendix), 1a1

b) assemble a list of needed TENEX features for the various sites, 1a2

c) rank these features in a priority for future TENEX releases, 1a3

d) discuss the characteristics and requirements of Service Sites, 1a4

e) and set-up a time schedule for future TAC meetings and TENEX releases. 1a5

Overall Goals 2

The followng are the goals which we feel the TENEX community should strive for and which we have sent to ARPA as the working polity of the TENEX community. 2a

1. To have all the features required by different sites in BBN TENEX within a year or 18 months. 2b

2. At that point, suggest that the only discrepancies from BBN TENEX be in the area of hardware drivers for devices that BBN does not have. It must be recognized that terminals are hardware, and changes in the TTY handlers will always be allowed. 2c

3. To keep an inventory of local TENEX software changes, and unusual local hardware. All software changes will be sent to TAC for review, and changes that look very bad will be referred to ARPA. 2d

4. Encourage all local changes to be made in the EXEC. Thus the heirarchy of programs will be as follows: 2e

a. TENEX - BBN version only 2e1

b. EXEC - domain of local variations 2e2

c. User Programs - completely up the local site 2e3

5. Make new realeases of TENEX more frequent, so that sites can keep abreast of what BBN is doing. The current goal is to release TENEX 1.33 by January 1, 1975. 2f

Needed TENEX features 3

After discussion by all the members of TAC, we agreeed upon the following list of needed TENEX additions. 3a

1. High priority - to be in TENEX 1.33 3a1

a. Mountable Disk Packs - parts of the file system are autonomous, and can be on-line or off-line without affecting the main file system.. 3a1a

b. Multi-fork Scheduler - under certain conditions, multiple forks will be considered as a unit, and the maintainance of their working sets will be similar to the current maintainance of a single fork's set. 3a1b

c. Big Character Input - will as a minimum allow input of ARC'S DNLS characters consisting of co-ordinate information plus a character 3a1c

(Already implemented at ARC) 3a1c1

2. Medium Priority - to be in TENEX 1.34 or 1.35 3a2

a. Better Error Handling - more human oriented reporting of hardware failures 3a2a

(Already implemented at ARC) 3a2a1

b. Better Pack swapping - more efficient swapping on disk packs 3a2b

(Already implemented at ARC) 3a2b1

c. Better scheduler Metering and Adjusting - allow sites to closely monitor the functioning of their system, and make necessary adjustments to improve efficiency 3a2c

(Already implemented at ARC) 3a2c1

d. Batch processing - allow capability for batch processing on TENEX 3a2d

e. Better Accounting - improve the accounting subsystem, This is neccessary for successful operation of Servie Sites 3a2e

f. Stronger File System - make file system more resiliant to crashes 3a2f

g. Drum Cache - when swapping from both the disk and drum, have the swapper insure that the most commonly used pages are on the drum, less used pages on the disk 3a2g

h. Maintainance of Utilities - keeping abreast of changes in such programs as BSYS, FTP, and SNDMSG 3a2h

ARC's Role in this Upcoming Development 4

As indicated in the above list of new TENEX features, ARC has already implimented a number of these, so we will be instrumental in putting these changes into BBN TENEX. The procedure for doing this is as follows. 4a

We will send a working design document to BBN for distribution to all TENEX sites by August 1. BBN will distribute this to all sites, and they will annotate it. We wil then travel to BBN to work with them on implementing Big Characters in a way which is most useful to the TENEX community. 4b

We will follow a similar procedure to get our scheduler changes and the meters neccessary for SUPERWATCH into the BBN monitor. However, this will happen later, as these features will not be distributed until 1,34 or 1,35. 4c

Further, we will assist in putting better hardware error reporting and better disk pack swapping into BBN TENEX. 4d

Description of Service Sites 5

We briefly discussed the role that service sites should have in the TENEX community. ARPA is very interested in such sites, and we have set forth the following criteria for a successful service site. 5a

First, a service site must be set-up with the best, state-of-the-art hardware available. This hardware must be compatable with BBN hardware, with a goal of running standard BBN hardware drivers, and an absolute minimum (preferably none) of changes to TENEX. This is to make the service site systems as reliable and stable as possible. 5a1

Second, a service site should be geographically near a research site, and the TENEX programmer at the research site should overview the operation of the service site. This is meant to solve the dilemma of service site personnel. The problem is

that the type of competant programmer needed to handle system problems is going to be terribly bored not being able to make any monitor changes. Thus we need an overlap with a site where such a programmer can do work, yet near enough to handle the emergencies. 5a2

Given these two criteria, the reliability and stability necessary for a service site are reachable. If one looks around the network, we find that only three locations meet these critera. BBN with their System-A and System-B, ISI with their KA-TENEX and KI-TENEX, and the ARC/OFFICE-1 group. And when our PDP-10 goes away, the ARC/OFFICE-1 group will no longer fit. 5a3

Essentially, what this means is that ARPA is going to have to provide more support before the service site idea can become functional. 5a4

Calendar for Upcoming Events 6

The basic deadline is that TENEX 1.33 will be released by January 1, 1975. Toward this goal, all major features for 1.33 will have design documents submitted to BBN before August 1. 6a

Also, there will be a TAC meeting in Boston around October 1 to review the plans for 1.33. 6b

Summary 7

In summary, I was very happy with the results of the first TAC meeting. Bert Sutherland is very interested in achieving the goal of a standard, network-wide TENEX which has all the capabilities needed by the different sites. The members of TAC understand that there is sufficient TENEX expertise on the net to reach this goal. What is required is the co-operation of the various sites and BBN to bring this to fruitation. The feeling I saw at the meeting was that the motivation for the expansion of TENEX currently exists. I think that the next year will be a very exciting time in the course of TENEX development. 7a

Appendix - TENEX Advisory Commitee Charter 8

1. To provide general guidance and advice to ARPA with respect to TENEX policy matters. 8a

2. To assist in the collection and evaluation of requirements for TENEX changes and additions and with setting priorities for accomplishing designated TENEX development activities. 8b

3. To recommend allocation of TENEX development activities to the available personnel and system resoucres of the TENEX sitses with appropriate recognition of interest, ability, experience, and limited personnel available, 8c

4. To evaluate tne quality and completeness (including documentation) of development work performed, 8d

5. To develop operational standards and procedures for TENEX service sites and to evaluate the performance of designated service sites, 8e

6. To advise on ARPA funded hardware procurement actions and to develop hardware configuration guidelines for TENEX service sites, Also to make recommendations on future processor (KI vs. KA, and single vs. dual) configurations, 8f

7. To maintain and review the contents of a network wide hardware and software registry. This registry will consist of a description of all non-standrd hardware, and non-standard sotfware, 8g

WRF 17-JUN-74 16:45 23390

Notes of the TENEX Advisory Committee Meeting

(J23390) 17-JUN-74 16:45; Title: Author(s): William R. (Ferg) Ferguson/WRF; Distribution: /SRI-ARC BOBM; Sub-Collections: SRI-ARC; Clerk: WRF;
Origin: (FERGUSON, TAC.NLS;5,), 17-JUN-74 16:33 WRF ;

WRF 17-JUN-74 16:54 23391

Response from Burchfiel on ARC-BBN EXEC Differences

So far BBN isn't very interested in our EXEC changes. However, given the TAC goals, we may be able to simply continue our changes, despite reservations from Craig.

Response from Burchfiel on ARC-BBN EXEC Differences

13-JUN-74 09:07:30,1973

Net mail from site BBN-TENEX rcvd at 13-JUN-74 09:07:23

Date: 13 JUN 1974 1206-EDT

From: BURCHFIEL at BBN-TENEX

Subject: ARC-BBN EXEC Differences and Possible Merge

To: ferguson at SRI-ARC

cc: sutherland, plummer, hedtler

Dear Bill:

Thanks for your note about ARC-BBN EXEC differences. As you mentioned, we have already implemented the change password command, (differently from your implementation), permit DOWNTIME to run as an ephemeron, and support the DISCUSE command.

We don't understand what your spec is for the NETWHEEL, NETUSER, and COMUSER options: Plummer hasn't received any code that mentions this.

Don Allen now has an initial version of our pie-slice scheduler on System C, and we feel that this supercedes, dominates, and supplants the GROUPSTAT facilities in the ARC EXEC.

Bill has reserved terminal types 5,6, and 13 for the use of ARC. He feels that it will be impossible to agree on a standard terminal type IMLAC, however, because we have two different IMLACS here, both of which are incompatible with both of your two IMLACS.

Our opinion is that the other changes which you made to the EXEC are of interest only to ARC, However, we may be quite wrong about that, To settle the question, I have submitted your writeup to ARPA's TENEX Advisory Committee with a request that they determine the extent of site interest in these other changes, and rank the important ones in some priority order with other ARPA research requirements for TENEX development effort.

I appreciate your offer of ARC effort to include these features. The best application for your effort is to partition your changes into separate files which may be included or not during assembly. Of course, some assembly switches will also be required in the main EXEC command table to link to these other assemblies.

Thanks for your help, and I'll let you know as soon as the TENEX Advisory Committee responds.

Best,

Jerry

WRF 17-JUN-74 16:54 23391

Response from Burchfiel on ARC-BBN EXEC Differences

(J23391) 17-JUN-74 16:54; Title: Author(s): William R. (Ferg) Ferguson/WRF; Distribution: /JCN KEV JCP; Sub-Collections: SRI-ARC; Clerk: WRF;
Origin: <FERGUSON>NEWS.NLS;2, 17-JUN-74 16:49 WRF ;

DVN 18-JUN-74 08:29 23392

Strings for the Scope of Subsititute

I.e. Substitute character in text. What ever happend to that good idea? 1

DVN 18-JUN-74 08:29 23392

Strings for the SCope of Subsititute

(J23392) 18-JUN-74 08:29; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /NEWNLS([ACTION]) ; Sub-Collections: DPCS SRI-ARC NEWNLS; Obsoletes Document(s): nn; Clerk: DVN;

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(J23392) 18-JUN-74 08:29; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /NEWNLS([ACTION]) ; Sub-Collections: DPCS SRI-ARC NEWNLS; Obsoletes Document(s): nn; Clerk: DVN;

RWW 18-JUN-74 10:46 23393

Jon Postel will be here this week Thurs and Fri for interviews, Jon will give a talk at 10:00 Thurs, Jon has a strong background in ARPANET Protocol development and software related to the network, He would work on the NSW protocol development effort we are proposing to ARPA, I am mking up a schedule and will contact people to talk with Jon, If I have not contacted you by the end of Tues and you would like to talk to Jon please see me, 1

(J23393) 18-JUN-74 10:46; Title: Author(s): Richard W. Watson/RWW;
Distribution: /SRI-ARC([ACTION]) ; Sub-Collections: SRI-ARC;
Obsoletes Document(s): n Postel visit: Clerk: RWW;