

## AUGMENT'S SUPPORT OF ORGANIZATIONS A BRIEF HISTORY

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This document contains a quick look at applications within three DoD organizations and how they affected the evolution of NLS/AUGMENT. The dates are from memory and may be off in some cases by a year or two, but the intent is to highlight organizations that had (or tried to have) an influence on the system's development toward supporting organizations.

1

### Background

2

The basic system was developed and evolved in the mid-to-late 60s through exclusive use by the development team in the Augmentation Research Center (ARC) at Stanford Research Institute (SRI). With the development of appropriate procedures and training, the goal was to significantly boost individual's, group's and organization's performance (somewhat in that order) by augmenting their ability to work with knowledge. Substantial progress was made in supporting individuals — most of the capabilities and features that now fall under "personal computing" were first reduced to practice within the ARC. Some progress was made toward basic "groupware" or computer supported collaborative work "CSCW" functions — electronic mail, a library system, real-time multi-party shared screen, as examples, were designed or implemented before the system was generally available to outsiders. See <131520,2:xb> for a list of features and capabilities.

2a

However, little progress was made in supporting organizations due (in part) to the inaccessibility of the laboratory at the ARC by the outside world. The development of the TENEX timesharing operating system and hardware pager for the DEC PDP-10 and the first digital packet-switched network (ARPANET) in the early 70s provided an opportunity to take the next step in the human/system co-evolution by cultivating its use in "real world" organizations.

2b

A series of display workstations were also developed during the 70's to support system use outside of the ARC. Each was based on commercially available equipment, modified with soft/firm/hard ware to meet an evolving set of workstation protocols. With the advent of the personal computer in the 80s, the protocols were implemented entirely in software on the IBM-PC. All versions supported attached mouse, keyset, printer, graphics workstation and a communications line. The approximate years when the various versions were available were:

2c

72-75 — IMLAC Graphics Computer

2c1

74-76 — ARC blue-box called a "lineprocessor"

2c2

75-80 — Data Media 2500

2c3

79-83 — Ontel

2c4

82- — IBM-PC

2c5

There were a number of early sponsor/user organizations, including Defense Advanced Research Projects Agency (DARPA), the National Science Foundation (NSF), and the Air Force at Rome Air Development Center (RADC) and also at Gunter Air Force Station. Later the Army became the dominant user, to include the Army Material Command (AMC) Hqs in Virginia, and several of its subordinate commands — Communications-Electronics in New Jersey, Testing and Evaluation in Maryland, and Aviation Systems, Troop Support and Logistics Management in Missouri. Later as the Army migrated to UNIX-based software, the Air Force Communications Command (AFCC) Hqs in Illinois emerged as the principle user organization.

2d

During the mid 70s a Workshop Utility Service was operated by the ARC and made available via the ARPANET. An active community of architects from each major user organization was formed and met twice a year to provide input on their needs and desires. Still, the high cost of computing power and communications via the ARPANET prohibited extensive use by most organizations.

2d1

In 1978 Tymshare acquired the rights to the software and renamed it AUGMENT. The system entered a phase of commercialization and also became accessible via Tymnet. By the early 80s Tymshare was manufacturing their own mini-computers and on-site installation of complete systems (hardware, software, communications, workstations, training, applications consulting) was being offered. At the peak, there were approximately 15 machines in operation serving a user population of several thousand people.

2d2

In 1984 McDonnell Douglas (MDC) acquired Tymshare (primarily for Tymnet), but had no interest in the office-automation market. The hardware/software/service product-line died from general mismanagement and lack of vision at MDC. However it took 6 years to do so, and during that time several hundred people at MDC and in their partner/supplier companies were exposed to the system during a series of pilot projects. Many of the underlying principles found their way into MDC advanced architecture planning documents.

2d3

It must be remembered that there were two major trends in the office systems area that ran counter to (and subsequently diverted attention from and delayed the acceptance of) the larger-picture view of "organizational computing."

2e

In the 70s it was the stand-alone word processor (that eventually added arithmetic and publishing features and evolved into "shared logic" machines).

2e1

In the 80s it was the personal computer (which, with the right software, obviated the need for a separate word processor) but which are now being networked to each other, to "servers" and to wide area networks.

2e2

After a twenty-year detour, the world may now be ready to seriously address the issues of organizational computing that Engelbart and his team seemed poised to tackle back in the early 70s. There were, however, a few organizations along the way that made beginning probes in that direction.

2f

**RADC, mid '70s**

3

After passively acting as contract monitor of the SRI/ARC effort in the late 60s, RADC established a research project to assess the potential of the system to support Air Force R&D operations. Following the example of the ARC, it was decided that Air Force (civilian and military) engineers, administrators, and managers would be the subjects of an extended pilot.

3a

The early 70's were spent in first accessing the system via teleprinter terminals and long-distance dialing, then installation of an ARPANET node on-site. To prepare the organization for the technology infusion that was to come, the latest in office equipment was installed; IBM Magnetic Tape Selectric Typewriters and Dictaphones!

3b

The system was used initially by individuals and small teams for tasks that would be supported today by applications such as: "word processing" "spreadsheet" "desktop publishing" and "electronic mail." But as the usage grew from the bottom-up to include a Section, then to the higher-level Branch and Division offices, it became clear that the existing general-purpose text processing facilities did not meet the organization's needs.

3c

Much of RADC's R&D is actually accomplished by contract, therefore a substantial portion of the knowledge work is centered around what DoD calls the Planning, Programming, Budgeting, and Execution cycle, i.e., figuring out what should be done, asking for the funds to do it, allocating the funds received, and contracting/monitoring/reporting the R&D effort — all within a continually changing political, economic, technical and regulatory environment. To support this activity, it was necessary to build:

3d

**Formatter**— a subsystem to help create and print official correspondence in the prescribed format.

3d1

**Template/Fill**- subsystems to support the on-line construction, filling and completion of "forms" where the information in the form might come from the user, a designated location in a file, or calculations made on other fields.

3d2

**FMS/DES** — Financial Management and companion Data Entry subsystems that performed a "data management" function associating people, dollars, time, and contracts within a hierarchical structure of technical planning objectives. It allowed managers to track expenditure of resources, play "what if" games with the resources, and let individual project and task engineers see how their work fit with others.

3d3

**Calendar**— a subsystem to assist in determining people's availability, and subsequently scheduling meetings and notifying participants.

3d4

**Correspondence**— a subsystem to log and track the correspondence that came into the RADC Commander's office. Used to determine when a response was due and by whom and if the due-date was met.

3d5

**Matcher**- a subsystem for determining the changes in a document from one version to the next; including statement deletions, additions, movements as well as textual changes within a statement.

3d6

**ALMSA, late 70's**

4

The system was used by a system development team within the Automated Logistics Management Systems Agency (ALMSA) with a mission to support program management people throughout the Army Material Command (AMC) — also called DARCOM. A "program manager" might have an annual budget from \$10 to \$100 million, so it seemed well worth the effort to try to improve the program manager's capability. The project had two constraints that had not previously been encountered; 1) the system was to be used from portable teleprinter terminals and 2) by higher-level people who could not be expected to spend much time learning how to operate it. These constraints led to a simplified system with continuous prompting called ELITE, containing the following subsystems which were focused on very specific tasks:

4a

**Budget**— assisted the user in filling out formatted budgetary forms and related justification statements.

4a1

**Calendar**— similar to the RADC Calendar subsystem but with the option of automatic notification via email.

4a2

**Message** — an interface to the ARPANET electronic mail package; similar to the Message subsystem available to all system users, but accessible from within ELITE.

4a3

**Milestones**— helped the user fill out a complicated project milestone chart in the specified Army format, update the time-lines and add, modify, delete and complete tasks.

4a4

**Regulations**— an index to a centrally maintained repository of Army and AMC regulations.

4a5

**Suspense**— a task assignment and due-date tracking subsystem, based on the RADC Correspondence system but more elaborate.

4a6

The ELITE system was programmed entirely by ALMSA people using the higher-level Command Meta Language for coding the user interface. This allowed developers to make calls to existing software in the "back-end" while providing a "front-end" that was deemed more user-friendly for its intended audience.

4b

**AFCC, mid 80's**

5

After early sponsorship by ALMSA, the Air Force Communications Command (AFCC) headquarters obtained their own contract to use AUGMENT services remotely at Tymshare. Subsequently, they leased 4 computers which were installed on-site at Scott AFB, Illinois, networked to each other and to the Defense Data Network. Initially the system was used to send/receive electronic mail among offices within the headquarters and between headquarters and field organizations. But the plan was to support the "staffing" activity throughout the entire 1500-person headquarters to the extent practicable. To accomplish this, additional features and capabilities were needed:

5a

**Roles** — Within AFCC (and most government offices) correspondence is directed to offices, not individuals. The correspondence must be answered, actions taken, decisions made, regardless of who may be filling the role of office-chief at the moment. A roster of people allowed to act on behalf of the office chief is maintained. A simi-

lar function was developed within the system, which allows roles to send/receive mail, establish reminders, make appointments, assign action-items, and sign documents — while maintaining the identity of the individual who was acting in the role at the moment.

5a1

**Signatures** — There is a legal necessity to be able to sign and verify signatures on correspondence. A means of accomplishing this was developed using a variation of the government-approved Data Encryption Standard (DES) public-private key encoding. In addition, at AFCC, it was decided that every document that was electronically signed should be considered an important organizational record, and therefore, was automatically entered into the Journal (considered by AFCC to be the corporate memory bank).

5a2

**Disposition-codes** — A complex 2-volume set of "rules and tables" specified the length of time documents of all types should be retained and the conditions under which they should be destroyed or archived. Periodically, office administrators would have to review all documentation stored in the office and determine its disposition. The introduction of the system caused administrative people to re-think these rules and procedures. As a result, it was determined that the document's author was the best judge of the retention value, that five codes would be sufficient to cover the range from Temporary to Permanent, and that only those documents entering into the Journal need be coded. This approach was cleared for experimentation with the National Archives.

5a3

**Suspense** — a greatly expanded version of the RADDC and ELITE approach, it allows the assignment of action-items and due dates to roles/individuals. The task can subsequently be reassigned any number of times, commented, completed, and cancelled or closed. As a transaction is made, the appropriate people are automatically notified via email and Reminders are set or cancelled as required. The resulting distributed database can be searched and flexibly viewed and copied. Provisions are available for archiving classes of records automatically or under database administrator control.

5a4

There were many other organizations that used the system throughout the 70s and 80s, many of which are listed below. The user population was distributed from Germany to Australia, with one remote shared-screen demonstration conducted from Singapore. The most common application of the system was for rapid communication via electronic mail, but applications ranged from: phototypesetting a complex JOVIAL programming manual, to conducting remote shared-screen briefings, to Zero Based Budgeting, to managing project libraries.

6

**Government**

6a

*Air Force*

6a1

AFCC - Air Force Communications Command

6a1a

ESD - Electronic Systems Division

6a1b

GUNTER - Gunter Air Force Station

6a1c

RADC - Rome Air Development Center

6a1d

WRAFB - Warner-Robins Air Force Base

6a1e

*Army*

6a2

HQ-DA - Headquarters, Department of the Army

6a2a

AAA - Army Audit Agency

6a2b

AMC - Army Materiel Command (also DARCOM)

6a2c

ALMSA - Automated Logistics Management Support Agency

6a2c1

ARRCOM - Armament Readiness Command

6a2c2

AVSCOM - Aviation Systems Command

6a2c3

CECOM - Communications-Electronics Command

6a2c4

ERADCOM - Electronics Readiness Command

6a2c5

MERADCOM - Mobil Electronics Readiness Command

6a2c6

MICOM - Missile Command

6a2c7

PTFD - Personnel and Training

6a2c8

TACOM - Tank and Automotive Command

6a2c9

TECOM - Test and Evaluation Command

6a2c10

PM-MEP - Army, Program Manager

6a2c10a

PM-SMOKE - Army, Program Manager

6a2c10b

YPG - Yuma Proving Grounds

6a2c10c

WSMR - White Sands Missile Range

6a2c10d

TRADE - Training and Development Command

6a2c11

TROSCOM - Troop Support Command

6a2c12

ARO - Army Research Office

6a2d

DESCOM - Depot Systems Command

6a2e

ANAD - Anniston Army Depot

6a2e1

CCAD - Corpus Christi Army Depot

6a2e2

LEAD - Leterkenny Army Depot

6a2e3

NCAD - New Cumberland Army Depot

6a2e4

RRAD - Red River Army Depot

6a2e5

SAAD - Sacramento Army Depot

6a2e6

SEAD - Seneca Army Depot

6a2e7

SHAD - Sharpe Army Depot

6a2e8

SIAD - Sierra Army Depot

6a2e9

TEAD - Tooele Army Depot

6a2e10

TOAD - Tobyhanna Army Depot

6a2e11

LCAQ - Logistics Communications Agency

6a2f

LSSA - Logistics Support Agency

6a2g

TSCHOOL - Army Training

6a2h

<i>Navy</i>	6a3
CNA - Center for Naval Analysis	6a3a
NSRDC - Naval Ship Research & Development Center	6a3b
ONR - Office of Naval Research	6a3c
<i>Other</i>	6a4
ADSTO - Australian Defence Science & Technology Organisation	6a4a
DARPA - Defense Advanced Research Projects Agency	6a4b
DMA - Defense Mapping Agency	6a4c
NBS - National Bureau of Standards	6a4d
<b>Commercial</b>	6b
ARCO - Atlantic-Richfield Company	6b1
BNR - Bell Northern Research	6b2
DAOP - Diebold Automated Office Program	6b3
MDC - McDonnell Douglas Projects	6b4
AICOM - MDC Artificial Intelligence Community	6b4a
ATF - Advanced Tactical Fighter	6b4b
CALS - Computer-aided Acquisition and Logistics Support	6b4c
MDC3S - McDonnell Douglas CAD/CAM/CALS System	6b4d
NASP - National AeroSpace Plane	6b4e
AFWAL SPO	6b4e1
Atlantic Research	6b4e2
General Dynamics	6b4e3
McAir	6b4e4
Pratt-Whitney	6b4e5
Rocketdyne	6b4e6
Rockwell	6b4e7
Textron	6b4e8
TAC - Teaming And Collaboration	6b4f
TOP - Technical Office Protocols (standards effort)	6b4g
PW - Pratt-Whitney	6b5
PM - Philip Morris	6b6
TRW	6b7

