The Director of Central Intelligence

Washington, D.C. 20505

Intelligence Research and Development Council   IR&DC 83-3317
                                                                 1 February 1983

MEMORANDUM FOR: Deputy Director of Central Intelligence

FROM: Richard D. DeLauer
                 Chairman

SUBJECT: Artificial Intelligence Recommendations

REFERENCES: A. DDCI Memorandum   25X1
                 B. IR&DC Report   25X1

    1. As you recall, upon reviewing the Council report on "Technology
Considerations for Improved Intelligence Capabilities," you asked to be
advised of specific recommendations concerning artificial intelligence (AI)
initiatives which may be useful for the Intelligence Community. Therefore I
am attaching a set which has been generated by the Council and which seem to
me to provide for a good starting position in bringing AI applications into
the Intelligence Community.   25X1

    2. One recommendation is that you and the DCI call out AI applications
specifically in your forthcoming budget guidance, and in this vein, I have
attached a suggested guidance draft. Another recommendation deals with the
establishment of an AI subcommittee of the IR&DC. This seems to me like a
good idea, and if you agree, I will take the action to set it up.   25X1

                                                    Richard D. DeLauer

Attachment:
 AI Recommendations

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Executive Summary

The following responds to your request for recommendations concerning the application of artificial intelligence (AI) technology in the Intelligence Community (IC). Developed more fully below, the Intelligence Research & Development Council (IR&DC) recommends that:

(1) Guidance be given to all IC Program Managers to include plans for applying artificial intelligence within their recommended FY-85 programs. A sample of suggested wording for such guidance is provided as attachment-A.   25X1

(2) A subcommittee of the IR&DC be established to provide needed information exchange on AI matters within the Community. The scope of this subcommittee would include technical information exchange, interfacing between basic AI research and IC applications, and coordinating IC AI activities.   25X1

(3) The IC continue to rely on the long-term financing of basic AI research by the Defense Advanced Research Projects Agency (DARPA), coordinating its requirements through the IR&DC AI subcommittee.   25X1

(4) The IC, itself, continue to concentrate on applying AI and prepare a list of applications which would solidify the commitment and alert researchers and vendors to Community needs. An initial set of candidate applications is included as attachment-B.   25X1

(5) Community ADP managers be advised that in all likelihood a more diverse set of computing hardware and languages will be required to support AI systems. Plans will need to be developed for maintaining these tools and integrating them into existing computer environments.   25X1

(6) Several nascent AI applications laboratories in the Community be expanded, and their timetables advanced, so as to form focal points for AI in the Community. Two such laboratories are those in the

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Engineering Topographic Laboratories (ETL) and the Office of Research
and Development (ORD). ☐   25X1

(7) An unclassified AI computer facility be established for the Community
and networked with the existing AI research centers via the ARPAnet.
This facility would provide a cost-savings link between the
Intelligence Community and the AI research community. ☐   25X1

(8) End-users of AI systems begin to allocate resources for technology
transfer, recognizing their commitment to provide domain-specific
expertise to be built into the systems. ☐   /   25X1

(9) The component agencies work together to plan for the internal
development of Government personnel in AI. ☐   25X1

As we indicated in our report, we are encouraged by recent breakthroughs in
AI and believe that there are many areas in the Community which could
benefit from applied AI technology. The recommendations contained in this
memorandum are aimed at accelerating current Community efforts in AI to
speed up the productive use of this technology throughout the Community.
Key among these recommendations are numbers 8 and 9. The projected
shortage of trained personnel, added to the normal security issues,
necessitates that the IC be able to supply a large proportion of its own AI
specialists. Therefore, training is paramount (Rec. 9). The importance of
Rec. 8, "End-User Planning", results from the lack of exposure of Community
components to the technology and their understandable general reluctance to
exchange current resources for future benefits. Although certain of these
recommendations may need to wait for FY-85, every effort should be made to
take preparatory steps in FY-83/84 and Program Managers should be asked to
address this specifically. ☐   25X1

1. DCI Guidance

Given the strong potential for AI applications in the Community, the
IR&DC recommends that guidance be given to all IC Program Managers to
aggressively pursue the technology and to plan for AI in their FY-85
programs. Each individual Program Manager will, of course, decide where AI
technology can best support his or her program. It is therefore
recommended that each Program Manager prepare a list of candidate projects
for early attention. A sample list is provided in attachment-B. Because
of the burgeoning technology and the Community's relative inexperience in
applying AI to intelligence problems, we recommend that the DCI resist at
this time the temptation to name a single AI focal point or lead office for
the Community. We suggest, instead, that the Community rely on developing
a program of information exchange concerning applied AI. Such a program
can and should be sponsored through the AI subcommittee of the IR&DC. ☐   25X1

2. IR&DC Subcommittee on AI

To coordinate the exchange of information in this field, we recommend
that a new subcommittee be established within the IR&DC to exchange
technical information, track basic research, evaluate Community
requirements from a technical perspective, and review technically the
development of Community AI systems. This subcommittee would serve as the

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major coordinating body for AI activities within the Community as well as
coordinate AI research efforts on the outside. Specifically, as indicated
below, this subcommittee will interface with DARPA (a member of the IR&DC
but not of the IC). As another example, a series of specific
recommendations have been developed by the EXRAND, including several
involving AI technology and these are endorsed by the IR&DC. These are
summarized in attachment-C. As a part of its charter the new IR&DC AI
subcommittee would monitor the progress of AI activities such as those
proposed by EXRAND.   25X1

3. Basic AI Research

While artificial intelligence has been under development for more than
25 years, there remain many fundamental problems to be solved. We
recommend that continued encouragement be given to DARPA, NSF, ONR, and
other funding agencies to support basic research in artificial
intelligence. Historically, these agencies have been providing more than
$10 M per year for AI research during this period. We hope that similar
levels of support would be continued in the future. The IR&DC would then
serve a coordinating role in expressing the needs of the Community to these
funding agencies.   25X1

4. IC Applications of AI

There are many areas where AI technology could be applied to
intelligence problems. Several initial efforts are already underway to
investigate the application of expert systems, natural language processing,
image understanding, and logic programming technologies and methods. A
preliminary list of potential Community applications appears in attachment-
B. This initial list presumably will be expanded and continually refined
by the IR&DC AI subcommittee. As usual, identifying suitable applications
and expressing Intelligence Community requirements to the research
community will be a challenging task requiring a deep understanding of both
AI technology and IC needs.   25X1

5. AI Computing Environment

Systems involving artificial intelligence generally have special
requirements which necesitate a computer environment that is somewhat
different from the classical data processing centers of the Community.
Consequently, the development of AI applications in the Community will
necessitate the member agencies' acquiring a diversity of computer
equipment (e.g., machines specifically designed to run the LISP programming
language). The various Program Managers should begin planning now to
allocate resources for these facilities. Admittedly a diversity of
computing equipment (and vendors) will be a hardship on ADP managers.
However, such equipment is essential at least for in-house research and
development efforts. Of course, every effort should be made as systems are
developed to ensure that operational systems will be as compatible as
possible with individual agency ADP masterplans and traditional mainframe
equipment.   25X1

6. Classified In-House AI Laboratories

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Current efforts to establish classified, in-house AI laboratories such as those in CIA-ORD, and ETL should be encouraged and expanded with additional funds. The special research-user relationships needed to develop applied AI support to operations argues for several distributed facilities as opposed to a centralized approach. Quality Government laboratory facilities will not only provide the computing resources necessary to conduct AI research and development but will also provide a mechanism for training Government personnel and attracting competent researchers from the universities and private industry. While recognizing the special security and privacy needs of each of the agencies, consideration should nonetheless be given to the electronic networking of selected Community AI research facilities to further the exchange of knowledge and information in the field. Recent advances in network security and compartmented dissemination substantially reduce the risks associated with such interconnections. 25X1

7. Unclassified AI Laboratory

In addition to in-house facilities for developing classified AI applications, the Community could also benefit from an unclassified facility which is connected electronically to other unclassified AI research centers outside the Community. Such a connection most likely would be via the existing ARPAnet which already connects most of the AI research centers in the U.S. The IC unclassified AI facility could be operated under contract following models established by DARPA such as the Information Sciences Institute at the University of Southern California. This facility could be used to cut down on Government commercial software development costs by providing Government-furnished computer time to contractors in an environment similar to the classified environment into which the operational system must eventually be placed. 25X1

8. End-User Commitment

The basic paradigm of an AI system is to develop a functionally capable system in the laboratory and then to load it with specific knowledge about the intended application. This knowledge is generally obtained from the customers for whom the system is being built. We recommmend that guidance be given to the various components to plan for a substantial consumer commitment to identify experts and to make them available to provide the required domain-specific knowledge. Further, these internal customers for AI technology will also need to plan adequate resources for operating and maintaining such systems once they are developed. Active user involvement in the technology transfer process should be ensured from the beginning. 25X1

9. AI Training

Perhaps the most important consideration for a long-term commitment to artificial intelligence will be the establishment of an adequately trained Government work force. Sufficient understanding of the tools and techniques of AI will be required of Government personnel to identify suitable applications, to monitor contracts, to select hardware and software, and to apply commercially developed products to the Community's needs. Because of strong competition for the relatively few skilled AI

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systems people available, the Community will have to establish training programs to develop its own internal expertise. Options available for acquiring this expertise include:

9.1 Establishing close relationships with the major AI research centers through summer institutes, post-doctoral fellowships, hosting professors on sabbatical, and extended on-site apprenticeships with the centers. 25X1

9.2 Encouraging and assisting employees to seek formal courses or graduate school training in AI and knowledge engineering. 25X1

9.3 Conducting an AI seminar or lecture series for members of the Community. 25X1

9.4 Sponsoring periodic AI symposia similar to the one recently hosted by CIA-ORD and CIA-OSWR at CIA Headquarters. 25X1

9.5 Developing a series of internal training courses for AI system developers and end-users. 25X1

9.6 Providing internships at Community AI laboratories for academic or industrial AI researchers. 25X1

Early consideration should be given to recruitment and training in FY-83 and 84 to form a cadre of knowledgeable personnel around which to build a viable program of applications beginning in FY-85. 25X1

10. The Scale of Community Efforts

It is premature to recommend a consolidated resource level to be applied to the program Community-wide. Experience has shown that substantive AI implementations in other areas require 25-50 person-years to achieve significant results on a single application. While this is not extraordinary when compared to other system development efforts, it is important to recognize that AI systems can be costly and may require several years to implement. At current prices, a well-designed AI laboratory typically might cost   In fact, as outlined in   25X1
attachment-C, the EXRAND subcommittee of COMIREX recently recommended that AI laboratories of ORD and ETL be enhanced by an additional   in   25X1
FY-83. Each Program Manager will want to assess the facilities available to him and weigh these against his agency's requirements before submitting a budgetary request. There are, however, several actions which could be developed on a Community-wide basis and which can benefit each of the agencies while avoiding redundancy. These activities of common concern could include setting up common AI training programs, establishing an AI software clearinghouse, and developing selected AI system development tools. Case-by-case investigation will be required to assess the trade-offs of the economy of scale of common actions versus meeting program-unique requirements. 25X1

11. The Need for Artificial Intelligence

To reiterate, the Intelligence Community is faced with a continuing

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set of technical problems involving the collection, processing, and reporting of intelligence. Advances in collection technology promise to continue to provide more data than we can process with common data processing technology. Valuable human expertise is lost every year as knowledgeable analysts retire or otherwise move on from their positions. Confusion mounts over just what it is that a particular quantitative technique really models or how to set the parameters to make it work. Information systems continue to be developed which are inflexible to changes in requirements and costly to modify. In short, much is being spent on developing automated systems, but the practical utility of such systems is not all it could be.

In conclusion, we believe that artificial intelligence is the only technology today with the promise of yielding the kinds of information systems needed to process the projected volumes of data and present it in a way that is meaningful to and efficient of our human analysts. The time is now to begin to build the kinds of systems which will be required by the mid- to late-Eighties, systems which employ the techniques of artificial intelligence.

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attachments as stated.

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ATTACHMENT-A

SAMPLE DCI GUIDANCE (U)

As in previous years, I wish to emphasize the importance of developing innovative technical and operational solutions to the intelligence problems that face us. Creative planning and application of appropriate technology should allow us to achieve the significant progress of which we are capable. 25X1

One can scarcely be unaware of the advances in computers. We must increase our efforts to take advantage of this technology. I believe that the advanced area of computer science, "Artificial Intelligence", has much to offer the Community. To this end, I have reaffirmed last year's DCI GOAL 12: "To Enhance Manpower Talent and Productivity (U)". It has been modified to recognize explicitly the potential contribution of advanced computer science. 25X1

GOAL 12: To Enhance Manpower Talent and Productivity (U)

Intelligence analysis and production remain a manpower intensive effort and we continue to suffer from a critical shortage of scarce skills. Methods must be found to ensure intelligence access to the necessary skills and to leverage through computer technologies our resident talents. The shortage of linguists and regional analysts will be particularly critical, but engineers and technical specialists will also be in short supply. Ways must be found both to increase the skilled manpower available and to improve the productivity of available personnel. 25X1

The capability of the Intelligence Community to recruit, retain, and ensure the productivity of necessary manpower remains limited. Colleges and universities continue to produce insufficient graduates with the skills required by the Community, nor is the shortage likely to be remedied through the decade. And, while public perceptions are slowly changing, the problem is still compounded by: an impression among undergraduates that past personnel cuts and hiring freezes reflect the long-term trend; a residual negative public attitude toward intelligence; and, competition from the private sector for the same skills. Consequently, it remains difficult to find qualified personnel, even when manpower positions are available. (C)

You should endeavor to initiate programs that will improve the Community's ability to recruit and retain the manpower necessary. Further, you should endeavor to initiate programs, based upon the most promising computer science advances, to multiply the productivity of available manpower. 25X1

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