Opportunities at ARPA, NSF, and Elsewhere

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Abstract

We first report the relatively minor development on the federal budget. We then touch upon announcements from ARPA, NSF, Defense Nuclear Agency, Rome Laboratory, US Special Operations Command, and Office of National Drug Control Policy. We also report a recent ARPA reorganization.

1 Little News Is Good News

Relatively little has happened regarding federal budget development since our last report. The House has passed an NSF funding bill with no changes to the version approved by the House Appropriations Committee. Compared to this year, the NSF budget will decline 6% to $3,160M in FY96. Most of these cuts are in the equipment and infrastructure area. The Senate has also passed an NSF funding bill, exceeding the House version by $40M in the research activities component.

The House Appropriations Committee also approved a defense bill. Under this bill, the Computing Systems and Communications Technology program will be funded at $403M in FY96, which is only $1M less than Clinton's request. The committee asks that ARPA, which manages the bulk of these funds, "should pursue cutting edge, high risk/high pay off research and advanced technologies".

In the meantime, the Senate passed a bill to eliminate the Office of Technology Assessment (OTA). The House Appropriations Committee also voted to reduce the FY96 budget for the Commerce Department severely and eliminate funding for the Advanced Technology Program (ATP).

2 Evolutionary Design of Complex Software

ARPA has recently announced a program, Evolutionary Design of Complex Software (EDCS). Innovative research is sought to "support the concurrent evolution of all artifacts describing a software system's design and implementation both during and after deployment". The program calls for a paradigm shift from the specify-build-then-maintain life cycle to continuous evolution. Technologies developed in this program should (1) support the design of software that facilitates evolution, (2) promote predictable and managed evolution of systems, and (3) provide capability to transform legacy systems into evolutionary systems.

EDCS aims to "develop economic methods for systems to keep up with changed requirements and operating environments over their lifetimes through:

- Providing a strong information base for evolution—e.g., by supporting the capture, modular structuring, and effective access of design rationale information (in both formal and informal formats), managing relationships among all different aspects of information, and providing enhanced automated support for software /system understanding.
- Enabling analysis of impacts of intended changes—e.g., through static analysis of impacts of change on performance, function, and other system attributes such as reliability and safety, dynamic analysis of change through modeling, rapid prototyping and improved testing capabilities.
- Enabling design and implementation of more adaptable systems—e.g., through the use of: improved system and software architecture notations and representations, technology to effect system changes through changes to a (hardware or software) architectural description, incremental verification and validation, very high level domain specific languages, architecture-based component selection and code generation, reengineering of legacy systems, and use of dynamic implementation languages that enhance the capability to make changes to operational systems."

Two types of proposals are solicited, both of which should provide these types of capabilities as well as re-

duce the cost of developing the infrastructure (e.g., languages, tools, data access mechanisms).

- **Technology Investigation Projects**, which are exploratory development efforts addressing one or more EDCS technology challenges. ARPA intends to fund such efforts at $200K to $400K per year for 2–3 years.
- **Capability Packaging Projects**, which are efforts addressing the packaging of capabilities suitable for use in application demonstrations with a possibility of eventual productization. ARPA intends to fund such efforts at $400K to $800K per year for 2–3 years.

Proposal abstracts were due 9/15/95, and full proposals are due 11/1/95. For more information contact Dr. John Salasin at ARPA/ITO or send email to baa9540@arpa.mil.

3 ARPA's Manufacturing Program

ARPA is soliciting proposals for research, development and demonstration in its Manufacturing Automation and Design Engineering (MADE) program. The objective of MADE is to develop engineering tools and information integration capabilities that could be used "to evaluate an order of magnitude more design alternatives than is possible today in an attempt to optimize product characteristics (such as quality, manufacturability, ssemblability, and maintainability), and quickly prototype complex products and processes". The current solicitation focuses on developing enabling technologies, tools, and infrastructure to provide support, through all phases of a design, to the engineer to explore, generate, track, store, and analyze design alternatives. MADE has two focus areas:

- **Enabling Technologies**, such as design space exploration, integration of design knowledge and engineering tools, content and context based retrieval and indexing of product designs, multi-level, multidisciplinary product simulations and analysis, automated design management systems, information intrastructure for collaborative design, and collaborative manufacturing.
- **Tools and Infrastructure**, such as generic tools that provide unique or novel capabilities for distributed and collaborative design and manufacturing, as well as innovative approaches to facilitate technology transition.

Proposal abstracts were due 7/28/95, and full proposals were due 9/5/95. An estimated $11M is available for funding in 1996, and additional funding may become available for 1997 and 1998. More information can be obtained by contacting Dr. Pradeep Khosla at ARPA/SISTO or sending email to baa95-37@arpa.mil.

4 NSF's GOALI Initiative

NSF has announced the Grant Opportunities for Academic Liaison with Industry (GOALI) initiative for 1995 (NSF publication 95-112). For a brief description of the objectives and focus of this initiative, see the March 1995 issue of this column. More details can be obtained by contacting Mike Roco of NSF at (703)306-1371.

5 Nuclear Effects Data Management

Defense Nuclear Agency (DNA) is seeking help to access and manipulate nuclear test data and to compare such data to analytic techniques and models. This effort spans data archival and retrieval, as well as modeling and simulation by analytical fits. Proposals are sought to develop an integrated data management system that "combines test data, environmental aspects of that data, models representing the data in a DARE (Data Archiving and Retrieval Enhancements) compatible form". The system should provide all information about atmospheric test data that researchers need to understand the data in context, such as geology, atmospheric conditions, gauge type and developer, gauge characteristics, implantation locations, relevant photographs and test results and calibrations. The point-of-contact for this announcement is David Nemerow of DNA at (703)325-6627.

6 Intelligence Data Handling

Rome Laboratory has a BAA (BAA96-01-PKPX) soliciting white papers for various scientific studies and experiments to demonstrate the broad range of capabilities and technologies applicable to the exploitation of intelligence data, the development of intelligence information, and the production and dissemination of intelligence products. The objective of this program is to develop an intelligence data handling environment for information processing, display, storage, and retrieval that can cope with the exponential growth of digital information. The program focuses in three areas:

- **Information Access** "seeks technologies and applications that will provide the search, discovery, and translation functions necessary to find relevant information in multiple, large scale, multimedia, intelligence information sources, refine information into a form suitable for exploitation by humans or advanced applications, and facilitate the dissemination of finished multimedia products. Specific technologies include but are not limited to [...] Internet based technologies to find, browse, retrieve, and customize multimedia products in a seamless manner, natural language and speech interfaces to [...] databases, automated indexing of multimedia data, message profiling, information parsing and extraction [...], intelligent assistants that can learn repetitive human computer interactions and build and optimize database schemas."

- **Analytical Systems** "seeks technologies and applications that will assist the intelligence analysts to rapidly visualize and assess situations, and produce concise descriptions. Technologies being sought include, but are not limited to, data fusion and visualization techniques that combine and present data from different sources into composite computing environments, artificial intelligence approaches (i.e. inductive learning, expert systems, neural networks, reinforcement learning, deductive databases, etc.) are also being solicited to assist in the generation of models of temporally and spatially related events and to facilitate analysis and prediction."

- **Advanced Systems Computing** "seeks technologies, tools and techniques to configure, install, manage, and test secure computing environments comprised of a heterogeneous mix of workstations, servers, and software".

Estimated funding is $4.8M. The cutoff date for submission of white papers is 10/31/95 for funding in 1996. The BAA is open for three years. For more details contact Dan Ventimiglia of Rome Laboratory at (315)330-2308.

7 BAA from US Special Operations Command

The US Special Operations Command (USSOCOM) has issued a BAA (BAA95-001) for research in C4I technologies. Two areas of research are of relevance to the database community.

- **Multi-level security databases and access methodologies**. Techniques and methodologies are sought "which will allow or enable multiple database or system users of varying security clearance levels to have access only to data authorized by that clearance and lower, but not data of higher classification. The solution must work with either relational or conventional databases containing data of varying classification levels for any particular subject matter or function; a solution that works with both types of databases is preferable."

- **Concurrent updating of multiple databases**. Techniques and methodologies are sought "which will allow or enable multiple databases or systems containing the same or parts of the same data stored in a standard format to be updated concurrently from one and also from multiple authorized producers. Databases and systems include permanent fixed site, temporary fixed site, and mobile categories world wide. The solution must include a data update logging mechanism to alert the user about missing data, and a methodology for requesting missing data."

This BAA remains open for two years from August 1995 to July 1997. Further information can be obtained by faxing requests to (813)840-5481.

8 Advanced Forensic Development

The Counterdrug Technology Assessment Center of the Office of National Drug Control Policy, which is the central drug enforcement research and development organization of the US Government, in cooperation with the Federal Bureau of Investigation Laboratory is soliciting white papers for innovative research and development projects in the advanced forensic development program. The goal of this program is to "employ innovative technological approaches to provide counterdrug enforcement and drug demand reduction agencies with increased forensic capabilities toward the presentation of reliable scientific evidence in courts of law under existing operational constraints." This BAA (BAA 96-01) focuses on nine major forensic disciplines, two of which are relevant to the database community.

- **Firearms/Toolmarks**. Development of "technological solutions and applications to an interactive and automated database for comparison, correlation, identification, and matching of firearms, cartridge cases, and bullets to suspects and weapons in drug and violent crimes".

- **Computers and Computational Research**. Analysis of "computer data and networks for pat-

terns of criminal activity and the recovery and presentation of erased, encrypted and compressed data, [and] computer aided presentation of complex evidence".

The BAA remains open until 9/30/96, and the first cutoff date for white papers is 12/31/95. Interested readers can request a Proposer Information Pamphlet by sending fax to the contract agent, US Army Directorate of Contracting, at (520)533-1600.

9 ARPA Reorganization

ARPA announced a reorganization in August, which consolidates the 9 technical offices into 6. The bulk of SISTO, where most database-related programs resided, are now in Information Technology Office (ITO) and Information Systems Office (ISO).