

Opportunities in Information Management and Assurance

Xiaolei Qian

Computer Science Laboratory, SRI International
333 Ravenswood Avenue, Menlo Park, CA 94025
qian@csl.sri.com

1 DARPA Interested in Information Management

The collaboration, visualization, and information management program at DARPA is soliciting proposals for research and technology development to advance the capabilities of networked systems to manage multi-media and multi-mode information. Of interest are scalable and interoperable middle-ware “for

1. managing exponentially growing information resources,
2. identifying materials relevant to a specific task, considering context, and
3. organizing information for rapid exploitation.”

Three topic areas relevant to the database community are identified. First is user-centered information analysis environments for correlation and manipulation of multimedia and complex information resources based on semantic content, visualizing complex and abstract information spaces, value-based filtering, and search, retrieval, and manipulation of multimedia and complex documents.

Second is scalable, secure, and interoperable information repositories supporting a wide range of information resources and services. Issues to be addressed include: registration and security of information resources and services, access control and rights management, automatic classification and federation, and distributed service quality assurance facilities.

Third is the intelligent integration of information. This topic area will be jointly funded by the I3 program of DARPA/ISO. Proposals are

sought for the definition, development, demonstration, and application of technologies to enable the intelligent search, retrieval, filtering, integration, abstraction, monitoring, and update of information from large collections of heterogeneous data sources, such as knowledge bases, structured databases, semi-structured documents, and unstructured text, image, and video files.

Details of the program can be found at <http://www.ito.darpa.mil/Solicitations>. Proposal abstracts were due 12/23/96, and full proposals are due 02/26/97.

2 Information Assurance of the ISO Architecture

The ITO and ISO offices of DARPA are joining forces in another program that aims at Information Assurance (IA) solutions for the Global Command and Control Systems Leading Edge Services (GCCS LES) architecture. The purpose of the program is to create the basis of high user confidence in the capabilities being offered by GCCS LES architecture. The IA architecture must be able to withstand system stresses through robust, adaptive, proactive protection and management of information and information transport services. 12 topic areas have been identified, the following of which are of particular interest to the database community.

Intrusion Detection “Approaches are sought for instrumenting critical applications and servers, as well as protocols (such as those used by CORBA), operating system, and network layers for collecting data for use in intrusion detection

analysis. The collection mechanisms should provide interfaces that allow selective collection and turning logs on and off. These interfaces should be protected by access control and should themselves be logged. Generic, specializable probes that can be inserted at various interfaces to rapidly develop new collection points are also desired. A common representation of security monitoring data is desired, as well as standard logging interfaces. Proposals are sought that integrate available intrusion detection analysis modules into the architecture through a standard interface. Interfaces should also be provided to allow for communication among analysis components at different sites, or reporting to a coordination center for broader situation assessment.”

Multilevel Security and Releasability “Approaches are sought that allow various communities, each operating at different system-high security levels, to be connected so that specific command and control services can operate across the boundaries, while enforcing the appropriate releasability and information flow policies. Controls are needed to allow the importation of data (and code) across the boundary while preventing the importation of malicious code, leakage of sensitive or classified information, and attacks that defeat the controls. Adequate assurance must be provided for these boundary controllers; the degree of assurance needed will depend on the difference in security levels across the boundary. Solutions are sought that provide more flexible interoperation with increased security, that can operate at very high speed for high-volume traffic, that are customizable and reusable in a variety of situations, and that do not require a human in the loop. In addition, approaches are sought for filtering CORBA IIOP traffic and to maintain secure connections or associations among interactions between communities at similar sensitivity levels. In addition, approaches are sought for integration of intrusion detection capabilities which can be used to monitor for indicators of covert information flow or signs of penetration of the boundary controller.”

Access Control “Approaches are sought that provide identity-based and role-based access control (RBAC), and possibly workflow controls where appropriate. The controls should allow for delegation in an emergency situation. An API must be provided to the access control service. Proposals may consider extensions of current technologies to deal with delegation of rights, control of propagation of rights, and revocation. Proposal should address the mechanisms to support the access control service and where in the distributed architecture they are to be placed. Infrastructure needed to support the service should be clearly identified.”

Interoperability “Approaches are sought that allow negotiation among sites each with a different collection of available IA mechanisms and policies. For example, two sites may have different suites of available encryption algorithms; the negotiation would have to discover which ones are in common and select from that set based on user preference and possibly system constraints imposed by both sites. At another level, the negotiation must allow for a high-level policy decision to be made regarding whether communication is allowed by policy of both sites. The approach should support the migration of new capabilities and security mechanisms into the architecture. Consideration should be given to maximizing the efficiency of the negotiation.”

This BAA will be open until 12/19/97. To be eligible for the initial round of evaluations, proposals must be received by 02/03/97. More detailed information and the Proposer’s Information Packet are available at <http://www.darpa.mil/baa/>.

3 NIMA University Research Initiative

The National Imagery and Mapping Agency (NIMA) recently announced its FY97 University Research Initiative. 7 research topics have been identified, including the following.

One area of interest is Intelligent Agents for Geospatial Information Discovery and Retrieval. Information source for producing and using geospatial information in the future will be varied, mul-

timedia, and mobile. “One way to deal with such complex information gathering tasks is through the use of intelligent network and server agents – software assistants which shoulder some of the processing load through built-in expertise, thereby adding value to the discovery and retrieval process. [...] The objectives of this program are

1. to determine how to build intelligent, mobile agents and use them for the discovery and retrieval of geospatial information;
2. to develop techniques to enhance the reliability and relevance of geospatial information discovered using intelligent agents;
3. to define appropriate coordination structures for roving agents in a networked environment; and
4. to devise a unified, comprehensive framework for using these intelligent agents.

[...] Data management will be a key concern in the systems of the future. Research should concentrate on how intelligent agents can contribute to the organization, distribution, transportation, and fusion of massive amounts of geospatial information available from a wide variety of information sources.”

Another area of interest is Like-Feature Detection. A difficult problem in integrating geographic data sets is to identify corresponding features in multiple data sets and to verify that they do indeed correspond to the same real-world entity. “The objectives of this program are

1. to develop an operational capability to detect probable ‘identity’ between corresponding features in multiple data sets and can eliminate false pairings;
2. to develop ways in which such an operational capability can ‘learn’ as new data sets are presented to it; and
3. to demonstrate ways in which the capability can be used to expedite various data integration and data maintenance tasks.”

White papers were due 01/13/97, and full proposals are due 02/18/97. Average award will be for a basic period of 3 years with \$150K–\$200K per year. More information about the program is available at <http://164.214.2.57/.NIMA/URI.html>.