

AWARD / CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		RATING DO-A7	PAGE of PAGES 1 19
2. CONTRACT (PROC. INST. IDENT.) NO. F30802-03-C-0007		3. EFFECTIVE DATE 18 NOV 2002		4. REQUISITION / PURCHASE REQUEST / PROJECT NO. See Section G	
6. ISSUED BY AFRL/IFKF USAF, AFMC AIR FORCE RESEARCH LABORATORY 26 ELECTRONIC PARKWAY ROME NY 13441-4514 MICHELE A. MARTINELLI 315-330-4731 martinem@rl.af.mil		COOE FA8750	6. ADMINISTERED BY (IF OTHER THAN ITEM 5) CODE S4404A DCMA SAN ANTONIO 615 EAST HOUSTON ST P O BOX 1040 SAN ANTONIO TX 78294-1040 SCD: C PAS: (NONE)		
7. NAME AND ADDRESS OF CONTRACTOR (NO., STREET, CITY, COUNTY, STATE AND ZIP CODE) CYCORP, INC. N/A 3721 EXECUTIVE CENTER DRIVE AUSTIN TX 78731-1615 (512) 342-4002				8. DELIVERY <input type="checkbox"/> FOB Origin <input checked="" type="checkbox"/> Other (see below)	
				9. DISCOUNT FOR PROMPT PAYMENT N	
				10. SUBMIT INVOICES (4 COPIES UNLESS OTHERWISE SPECIFIED) TO THE ADDRESS SHOWN IN	
CAGE CODE 02UQ4				FACILITY CODE	
11. SHIP TO / MARK FOR See Section F		CODE	12. PAYMENT WILL BE MADE BY DFAS-COWEST ENTITLEMENT OPER P O BOX 182381 COLUMBUS OH 43218-2381 EFT: T		
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13. AUTHORITY FOR OTHER THAN FULL AND OPEN COMPETITION				14. ACCOUNTING AND APPROPRIATION DATA See Section G	
15A. ITEM NO See Section B	15B. SUPPLIES/SERVICES		15C. QUANTITY	15D. UNIT	15E. UNIT PRICE
					15F. AMOUNT
16G. TOTAL AMOUNT OF CONTRACT					\$9,893,161.00
16. Table of Contents					
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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE					
17. <input checked="" type="checkbox"/> Contractor's Negotiated Agreement (Contractor is required to sign this document and return 1 copies to issuing office). Contractor agrees to furnish and deliver all items or perform all services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)			18. <input type="checkbox"/> Award (Contractor is not required to sign this document). Your offer on solicitation number, including the additions or changes made by you which additions or changes set forth in full above, is hereby accepted as to items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.		
19A. NAME AND TITLE OF SIGNER (TYPE OR PRINT) MARY SHEPHERD SR. V.P. FINANCE & ADMIN			20A. NAME OF CONTRACTING OFFICER GARY MANCUSO		
19B. Name of Contractor		19C. Date Signed	20B. United States of America		20C. Date Signed
<i>Mary Shepherd</i> (signature of person authorized to sign)		11/15/02	<i>Gary Mancuso</i> (signature of Contracting Officer)		18 NOV 2002

**AIR FORCE RESEARCH LABORATORY
ROME RESEARCH SITE
ROME, NEW YORK**

**STATEMENT OF WORK
FOR
TERRORISM KNOWLEDGE BASE (TKB)**

PR No. T-3-4514

22 OCTOBER 2002

Attachment No. 1

(Contract No. F30602-03-C-0007)

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1.0 OBJECTIVE.

1.1 The objective of this effort is to support analysts by developing a comprehensive Terrorism Knowledge Base (TKB).

2.0 SCOPE.

2.1 The scope of this effort is the development of: 1) the TKB, 2) Knowledge Entry Tools, and 3) Scenario Generation (SG) capability.

3.0 BACKGROUND.

3.1 The goal of the Total Information Awareness (TIA) Program is to provide significant improvement in the ability to detect asymmetric threats to national security. TIA is an umbrella program aimed at detecting, classifying, linking, tracking, and understanding information gathered from traditional and non-traditional information sources. It is focused on bringing prototype tools and capabilities to the DoD intelligence agencies so that analysts will be better able to identify potential threats to DoD forces and to the nation. Program efforts are intended to provide a series of increasingly powerful leave-behind prototypes with a limited number of proof-of-concept demonstrations in extremely high risk, high payoff areas. Technology areas include data repositories, collaboration, and prototype systems, as described below:

3.1.1 Data Repositories (TIA/Genisys). In the context of this program, the term repository is intended to convey a new kind of extremely large, omni-media, virtually-centralized, and semantically rich information repository that is not constrained by the limited commercial database products available today. Much of the existing database and repository technology is based on a paradigm defined in the 1980's. Today, computer processors, storage media, and networks are a thousand times more capable. The goal is to reinvent database technology consistent with today's needs and capabilities. To predict, track, and pre-empt attacks requires a full coverage repository containing all information relevant to the tasks of identifying potential terrorists and their supporters, activities, prospective targets, and operational plans. Innovative technologies to architect, populate and exploit such a repository for combating terrorism will be developed under this technology area.

3.1.2 Collaboration (TIA/GENOA II). The focus of collaboration is on developing information technology needed by teams of analysts and operations and policy personnel to anticipate and preempt threats to U.S. interests. The goal is to make such teams faster, smarter, and more joint in their day-to-day operations. It will apply automation to team processes so that more information can be exploited, more hypotheses created and examined, more models built and populated with evidence, and overall, more crises dealt with simultaneously. Specific areas include: a) cognitive aids that allow humans and machines to think together in real-time about complicated problems, b) means to overcome the biases and limitations of the human cognitive system, c) cognitive amplifiers that help teams rapidly and fully comprehend complicated and uncertain situations, and d) the means to rapidly and seamlessly cut across and complement existing stove-piped hierarchical organizational structures by creating dynamic, adaptable, peer-to-peer collaborative networks.

3.1.3 Prototype Systems (TIA/TIA Systems). The TIA program will develop and integrate information technologies into fully functional, leave-behind prototypes that are reliable, easy to install, and packaged with documentation and source code (though not necessarily complete in terms of desired features) that will enable potential users to evaluate new technologies through experimentation and rapid transition to operational use. The goal is to create a series of prototype, closed-loop, end-to-end systems. Software products resulting from the two technical areas above as well as other technologies will be integrated to provide these systems.

3.2 This effort addresses the TIA technical area of Collaboration (TIA/GENOA II).

4.0 TECHNICAL REQUIREMENTS.

4.1 The contractor shall produce and validate Version 1 of a Terrorism Knowledge Base (TKB) with Explanation Generation.

4.1.1 Analyze terrorism domain knowledge.

4.1.2 Identify domain concepts and relationships.

4.1.3 Develop an ontological architecture guiding the handling of domain concepts.

4.1.4 Create and extend the general ontology and TKB content. Include the introduction of new terms into the ontology, and their proper axiomatization including taxonomic and domain-specific predicates.

4.1.5 Design and develop a template based Query and Answer (QA) interface to the TKB.

4.1.5.1 Analyze the types of questions analysts should be able to ask, and the kinds of answers they should receive.

4.1.6 Develop and implement an explanation generation capability.

4.1.7 Enter terrorism domain knowledge, in coordination with domain experts from the Terrorism Research Center.

4.1.8 Validate the TKB with Domain Experts.

4.1.9 Validate the TKB with an independent user or Command.

4.1.10 Produce and validate a set of Knowledge Entry (KE) Tools.

4.1.10.1 Extend Rapid Knowledge Formation (RKF) KE tools to provide enhancements to the KE process.

4.1.10.2 Develop KE tools which enable entry of terrorism domain entities and relationships.

4.1.11 Produce and validate a SG capability.

4.1.11.1 Develop concepts for SG.

4.1.11.2 Identify behavior modeling requirements. Utilize, and drive the terms being entered into the TKB.

4.2 The contractor shall produce and validate Version 2 of the TKB with Explanation Generation.

4.2.1 Extend the general ontology and TKB content to allow for more sophisticated KE and explanation generation, based on inefficiencies, inadequacies and difficulties experienced with Version 1 of the TKB.

4.2.1.1 Analyze the success of this ontology extension to surmount identified problems.

4.2.2 Increase flexibility of QA interface.

4.2.2.1 Increase the complexity of the kinds of questions users may ask.

4.2.2.2 Base the interface on a query language.

4.2.3 Extend the explanation generation capability.

4.2.3.1 Produce clear, user-intelligible, explanations for increasingly complex questions.

4.2.3.2 Develop techniques for optimal organization and presentation of explanations.

4.2.4 Enter terrorism domain knowledge.

4.2.4.1 Support the use of sophisticated reasoning and explanation.

4.2.4.2 Increase the breadth of consideration entering into terrorism reasoning.

4.2.4.3 Enter knowledge to cover new terrorist entities and relationships.

4.2.5 Validate the TKB with domain experts.

4.2.6 Validate the TKB with an independent user or Command.

4.2.7 Extend KE tools to support the entry of additional types of knowledge as identified in paragraph 4.2.4.

4.2.8 Develop SG algorithms at the strategic level.

4.2.9 Enter behavior models and scenario knowledge at the strategic level.

4.2.10 Validate behavior models, scenario knowledge, and SG at the strategic level with domain experts.

4.2.11 Validate behavior models, scenario knowledge, and SG at the strategic level with an independent user or Command.

4.3 The contractor shall produce and validate Version 3 of the TKB with Explanation Generation.

4.3.1 Extend the general ontology and TKB content for SG.

4.3.1.1 Continuously analyze difficulties with SG. Add to and/or improve supporting ontologies.

4.3.2 Extend the QA interface to support SG.

4.3.3 Integrate the SG capabilities into the QA interface.

4.3.4 Extend the explanation generation to include explanation of generated scenarios.

4.3.5 Enter terrorism domain knowledge in support of richer, more informed and realistic SG.

4.3.6 Validate the TKB with domain experts, focusing on SG.

4.3.7 Validate the TKB with an independent user or Command.

4.3.8 Enhance the KE tools based on user feedback.

4.3.9 Develop SG tools at the tactical level.

4.3.10 Enter behavior models and scenario knowledge at the tactical level.

4.3.11 Validate behavior models, scenario knowledge, and SG at the strategic level with domain experts.

4.4 The contractor shall ensure robustness of the TKB.

- 4.4.1 Complete the KE tools to a level of robustness and ease of use, for maintaining the TKB.
- 4.4.2 Validate the TKB with domain experts in conjunction with TIA System program.
- 4.4.3 Enhance the TKB based on feedback from domain experts.
- 4.4.4 Validate the knowledge entry tools with TIA System users.
- 4.4.5 Validate the full SG capability with TIA System users.
- 4.4.6 Incorporate changes to the KE tools and SG capability in response to TIA System evaluation.
- 4.5 The contractor shall provide support for transitioning of the TKB.
 - 4.5.1 Produce a packaged and validated TKB with general ontology and KB content, QA interface, explanation generation capability, KE tools, and SG capability.
 - 4.5.2 Continuously incorporate feedback from initial transition experience, to produce a reliable and robust TKB.
 - 4.5.3 Develop and provide training for all aspects of the TKB.
- 4.6 Program demonstration, evaluation, and participation:
 - 4.6.1 Demonstration and Evaluation
 - 4.6.1.1 Work with the Genoa II Test & Evaluation contractor to define a generic test suite.
 - 4.6.1.2 Design a tailored test suite for TKB.
 - 4.6.1.3 Conduct annual test & evaluations on the tailored test suite.
 - 4.6.1.4 Develop demonstration scripts, document demonstration objectives and describe functions and capabilities to be demonstrated. Include concise, step-by-step instructions on how to replicate the demonstration, including the target software demonstration environment. (See CDRL, A003)

4.6.1.4.1 Provide technical evaluation of experimental results and report the results to the Genoa II Program. (See CDRL, A004)

4.6.2 Program Participation

4.6.2.1 Participate in program reviews, workshops, demonstrations, annual evaluations, and DARPA Principal Investigator (PI) meetings as specified in the contract schedule.

4.6.2.2 Collaborate and cooperate with other TIA/Genoa II contractors for: a) duplication avoidance, b) ensuring the interoperability of languages, tools, and middle-ware to avoid "stovepipe" solutions, and c) ensuring the efficient planning and conduct of demonstrations of developed technology.

4.6.2.3 Conduct oral presentations at program reviews and DARPA PI meetings and workshops. Provide the status of the technical progress made to date in the performance of the contract, and the overall program direction, successes, and significant issues. (See CDRL, A002)

4.7 Deliver all computer software developed, assembled, or acquired in accordance with the contract schedule and the following.

4.7.1 Provide commented software source and executable object code for all developed software. (See CDRL, A005)

4.7.1.1 Provide the executable code to other TIA program participants for testing, evaluation, and potential integration with other components of the TIA system.

4.7.1.2 Package software releases as self-extracting installation executables.

4.7.2 Install the developed software products at Rome Research Site for demonstrating the advanced technology to prospective Air Force customers.

4.7.3 Document installation, user, and maintenance instructions for all developed software components. (See CDRL, A006)

4.7.4 Transfer all purchased and licensed software used during development or as a component for this effort upon completion; include licensing and maintenance agreements and the original media software and documentation. (See CDRL, A007)

4.7.5 Developed software shall be completely maintainable and modifiable with no reliance on any non-delivered computer programs or documentation.

4.8 Reports and Documentation

4.8.1 Continually determine the status of this effort. Provide comprehensive, yet succinct reports documenting progress toward the accomplishment of contract objectives and requirements. (See CDRL, A001)

4.8.2 Supply program documentation, such as, white papers, presentation materials, technical documents, user's instructions, and software developed under this effort to the TIA web portal.

4.8.3 Document all technical work accomplished and information gained during performance of this acquisition to permit full understanding of the techniques and procedures used in evolving technology or processes developed. Include objectives, approach, science involved and concepts employed, significant observations, problems, positive and negative results, and design criteria established. Document procedures followed, processes developed, "lessons learned", and other useful information. If applicable, cross-reference each design, engineering, and process specification delivered. (See CDRL, A008)