



PROPOSER INFORMATION PACKAGE (PIP)
INFORMATION EXPLOITATION OFFICE
URBAN REASONING AND GEOSPATIAL EXPLOITATION
TECHNOLOGY (URGENT)

BAA 07-13

2 FEBRUARY 2007

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A PROGRAM DESCRIPTION AND GOALS

A.1 PROGRAM OBJECTIVE

The objective of the Urban Reasoning and Geospatial Exploitation Technology (URGENT) program is to develop a 3D urban object recognition and exploitation system that enables advanced mission planning and situation analysis capabilities for the warfighter operating in urban environments. DARPA/IXO is soliciting proposals for URGENT Phase 1, which focuses on the development of novel and innovative approaches to urban object recognition from electro-optical (EO) and light detection and ranging (LIDAR) sensor data.

A.2 BACKGROUND AND MOTIVATION

The recognition of targets in urban environments poses unique operational challenges for the warfighter. Historically, target recognition has focused on conventional military objects, with particular emphasis on military vehicles such as tanks and armored personnel carriers. In many cases, these threats exhibit unique signatures and are relatively geographically isolated from densely populated areas. The same cannot be said of today's asymmetric threats, which are embedded in urban areas, thereby forcing U.S. Forces to engage enemy combatants in cities with large civilian populations. Under these conditions, even the most common urban objects can have tactical significance: trash cans can contain improvised explosive devices, doors can conceal snipers, jersey barriers can block troop ingress, roof tops can become landing zones, and so on. Today's urban missions — from event security to insurgent extraction — involve analyzing a multitude of urban objects in the area of regard.

As military operations in urban regions have grown, the need to identify urban objects has become an important requirement for the military. Understanding the locations, shapes, and classifications of objects is needed for a broad range of pressing urban mission planning analytical queries (e.g., finding all roof top landing zones on three story buildings clear of vertical obstructions and verifying ingress routes with maximum cover for ground troops). In addition, it will enable automated time-sensitive situation analysis (e.g., alerting for vehicles found on a road shoulder after dark and estimating damage to a building exterior after an explosion) that would make a significant positive impact on urban operations.

A.3 TECHNICAL APPROACH

Phase 1 of the URGENT program will develop techniques for the rapid exploitation of EO and LIDAR sensor data at the city scale (100s KM²) to recognize urban objects down to the soldier scale (<1M³). EO is a rich source of 2D feature information, such as color and line orientation; LIDAR is a rich source of 3D feature information, such as shape and elevation. URGENT will apply image processing technology to this geospatially registered 2D/3D data collected from airborne and terrestrial sources,



yielding precise annotations for the objects in an urban area. Traditional pattern recognition systems, biologically inspired computer vision technology, and machine learning algorithms are among the approaches of interest to the URGENT program. This solicitation is for Phase 1 of URGENT and is solely focused on urban object recognition.

Phase 2 of the URGENT program will develop a 3D reasoning engine to query over object shapes, locations, and classifications for rapid urban mission planning and situation analysis. Phase 3 will focus on the integration and transition of the URGENT system to the National Geospatial Intelligence Agency (NGA). Although Proposers should be mindful of the downstream processing of URGENT Phase 1 products, DARPA/IXO is not soliciting proposals for URGENT Phases 2 and 3 at this time.

A.3.1 Sensor Data

The URGENT system will perform exploitation of 2D/3D data acquired by one or more collection systems over an urban region; new approaches to 2D/3D data collection are not in the scope of the URGENT program. The Government will supply URGENT performers in Phase 1 with data through a pre-award data collection. Data will be made available to developers at the URGENT kick-off meeting. The majority of the data collected will be provided to the performers, but a portion of the data will be sequestered for the purpose of performing an independent government performance assessment.

The initial data set will consist of (1) airborne LIDAR and color EO data, and (2) ground-based LIDAR and color EO data collected over a one square kilometer urban area. The data will be provided with the respective airborne and terrestrial LIDAR and EO data registered, and with the airborne and terrestrial collections registered. (Proposers are encouraged to review example data at <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>. It is anticipated that the government will execute additional data collections during Phase 1 of the URGENT program will provide performers with data that includes examples of all objects in the URGENT 150 (discussed below) with a variety of conditions and view angles.

The scale of interest for URGENT is driven by high-resolution data sources from emerging wide area airborne and ground-based systems. While the size of the region may vary with different collection scenarios, URGENT's collection area will typically be between 1 to 5 square kilometers. The Government will use several collection platforms during the course of the URGENT program. As a reference, Table 1 outlines the airborne and terrestrial platforms LIDAR sensors that URGENT will utilize for the pre-award data collection. The Table indicates the approximate upper and lower bounds for each parameter. Independent Post Spacing (IPS) refers to the cross-range spatial separation between independent range measurements made with the LIDAR. Range Precision is the repeatability (1σ) of the measurements and range resolution refers to the minimum separation in range along the line-of-sight of the LIDAR required for two objects to be distinguished from each other. Swath Width refers to typical scan width of the systems during collection, and Density is an estimate of how much of the particular 1 to 5 km² areas will be covered with each sensor.

Table 1. URGENT Airborne/Terrestrial LIDAR Data Product Descriptions

Platform	IPS [cm]	Range Precision [cm]	Range Resolution [cm]	Swath Width [m]	Density [%]
Vehicle Mounted Terrestrial LIDAR	5 - 10	2.5 - 5	N/A	10 - 20	10
Airborne COTS LIDAR	20 - 100	5 - 10	≥200	50 - 200	100
Low-altitude Photon-counting LIDAR	10 - 30	10 - 20	≥20	30 - 90	20
Higher-altitude Photon-counting LIDAR	30 - 100	20 - 30	≥50	90 - 500	100

The spatial sampling densities for airborne and ground LIDAR sources will range from 3 centimeter to 30 centimeter IPS. This will result in ~40-400 samples per 3D object. Airborne color EO data will be collected at 15 centimeter resolution while terrestrial color EO data will be collected at 5 centimeter resolution.

The 3D LIDAR data will be provided as point cloud data sets in compressed ASCII format consisting of ordered quadruplets of Northing, Easting, Elevation, and Uncalibrated Intensity referenced to the WGS-84 coordinate frame. Some instances of preprocessed data sets composed of extracted bare earth digital elevation models and associated point cloud unclassified returns will be provided as exemplars for initial orientation purposes. Ground finding routines, object segmentation, and extraction considered to be part of the preprocessing steps the performers will need to accomplish to work with the registered data sets. Some of the data sets will include measurements made from a number of independent views, either from separate instruments or successive scans. The details associated with these measurements will be included in descriptive text file accompanying the data.

Note: Airborne LIDAR collected under the URGENT program may be labeled as FOUO (For Official Use Only). FOUO URGENT data must be protected by recipients to prevent disclosure. Servers providing access to FOUO data will use encrypted methods of communication to access that data. URGENT contractors accessing FOUO URGENT data stored on servers will be required to be authenticated as a valid recipient before being allowed to access the material. No FOUO URGENT DATA will be allowed on public web or anonymous FTP servers. All CDs containing FOUO URGENT data must be labeled as FOUO.



A.3.2 Object Recognition

The core function for URGENT to be developed in Phase 1 is object recognition, which in this context means the correct extraction *and* identification of urban objects from registered EO/LIDAR imagery. These are described in greater detail below.

The Government has developed the *URGENT 150* objects of interest for Phase 1, shown in Table 2. The URGENT 150 provides a list of object classes, instances of which will be present in the EO/LIDAR data used in the URGENT program. By contract award, this list will be prioritized and updated by the Government based upon current and future operational needs.

A.3.3 Object Extraction

The primary objective of Object Extraction is to detect and segment objects of interest from 2D/3D data. DARPA is interested in new and innovative approaches that will consistently extract urban objects ranging in size from 1 to 100 meters across large, complex urban areas. Existing technology for extracting vehicles from LIDAR typically search an area for cues, segment the detected candidate objects into independent volumes, and perform clutter rejection to reduce false alarms. While performance of this technology has been excellent for vehicle extraction on a previous DARPA program, this was largely due to the unique features of vehicles (e.g., size and location) it was able to exploit. For urban objects, it is unclear whether this approach will be robust enough to extract the breadth of objects in the URGENT 150, many of which will not be on the ground plane. In addition, objects in the URGENT 150 will not be uniformly distributed across a region; therefore, object extraction methods that intelligently search different areas with variable intensity of are also of interest.

Myriad technical approaches to object detection and segmentation exist, but their performance must be analyzed against URGENT's unique urban application. For example:

- Object detection may require different approaches depending on object sizes or assumed object classes. For example, filters to detect satellite dishes may be the same as those used to detect solar panels, but different from those required to detect buildings. If a single detection algorithm is proposed, it should clearly outweigh the performance of specialized filters. Conversely, proposing multiple filters will increase the computational load and this burden should be offset by superior algorithm performance.
- Area delimitation may provide a mechanism to reduce the computational burden of processing all the volumetric data in a region. If areas that will not contain any objects of interest can be identified early in the analysis, a substantial computational saving may be achieved. But the breadth of objects being considered may reduce this savings and negatively affect performance if it fails to detect all objects of interest in a region.



- Clutter rejection approaches can provide a screening mechanism that rapidly dismisses a significant number of potential false alarms in order to mitigate the computationally intensive object identification process. However, their past success has been restricted to problems with limited numbers of objects of interest (e.g., military vehicles or air defense platforms). Proposers should consider how specialized the rejection algorithms should be and their impacts on algorithm performance and computational processing.
- Object Identification may provide contextual information as feedback to Object Extraction as it analyzes a region. For example, a water tower on a building roof may initially be segmented as part of the building. If Object Identification identifies the object as building, it can return the non-building components to Object Extraction, which could use the building information as context in re-segmenting the returned components. For the purposes of URGENT during Phase 1, context information must be derived primarily from the EO/LIDAR data provided; the Government will not provide external data sources for this effort.

A.3.3.1 Object Identification

The primary goal of Object Identification is to classify all candidate objects generated by Object Extraction that are proper instances of classes in the URGENT 150. Traditional Automatic Target Recognition (ATR) methods have used templates or model-based approaches to classify targets with varying degrees of success. However, these methods require extensive model libraries be maintained by the Government. Inserting new models into the libraries requires the arduous creation of a detailed model and recompiling model libraries in order to achieve any reasonable level of recognition performance. Operationally, maintaining and inserting models has been viewed as unduly burdensome in dynamic battlespace environments. For these reasons, *DARPA is particularly interested in innovative approaches to Object Identification that require neither the creation of highly detailed object models nor the extensive maintenance of model libraries.*

It is envisioned that the URGENT system will identify specific urban objects of interest in a city containing thousands of objects, with variability in 3D viewpoint, inter- and intra-class appearance, articulation, scale, and occlusion. Of special interest are innovative approaches that support far greater variability than the existing detailed model methods typically used for identification. It is expected that URGENT object identification algorithms will support:

- Recognition of an object as a collection of parts whose sizes and precise relationships are unspecified (e.g., classify an object as a building without seeing all the windows, doors, walls, or roof).
- Recognition of an object from viewing angles and distances.
- Recognition of objects with a high degree of intra-class variability (e.g., lamp posts with one light, two lights, or more; road signs of different shapes).



- The exploitation of object knowledge when available from other sources or acquired through examples (e.g., a building's external doors are typically located at ground level).

A key challenge of Object Identification will be to identify partially occluded objects in urban environments. It is estimated that at least 25% of the total objects in an urban scene will be occluded and that URGENT data sets will include objects with up to 50% occlusion. However, while object occlusion in 2D data can negatively impact identification, in 3D data occlusion can provide additional feature information for identification. URGENT will generalize and exploit partial or overlapping data in correctly classifying an object in the presence of real world visual obstructions. Potential approaches include, but are not certainly limited to:

- Computer vision algorithms inspired by the neural architecture of the primate visual system.
- Pattern matching algorithms that exploit three dimensional object representation and object relation schemes for identification.
- Machine learning algorithms that classify object instances based on training from a limited number (<15) of exemplars and imprecise models.
- Shape symmetry representations robust to missing components and occlusions.
- Histogram methods for efficient search that utilize invariant histograms formed from discrete point clouds.
- Generalized transforms and parameterization of urban objects features.

Proposers should identify the amounts of data required to validate their technical approaches and be realistic in their assessments. Unduly burdensome data requests will be traded against potential algorithm performance impacts during evaluation.



Table 2. URGENT 150 Urban Objects of Interest

Urban Entities	Buildings/Sites	Road/Transportation	Water/Marine Objects	Building Components	Terrain	Vegetation
bus stop	airport airfield	alley	aqueduct	chimney/smokestack	crater	aquatic plants
aerial cableway line	apron/hardstand	bridge	canal	cone roof	cultivated cropland	bushes
cistern	athletic field	bus terminal	culvert	door	cutting	climber
clock	barn	crosswalk	dock	drainage	ditch/pit	tree
conveyor	building	curb	embankment	fire escape	range land	grass/lawn
cooling unit	campground	footpath	filtration aeration bed	flat roof	ricefield	hedgerow
crane	cemetery	ford	flume	gabled roof	swamp/marsh	treerow
dish	comms facility	motorway/highway	jetty	patio	trench	
dragon teeth	dam	paved road	lake/pond	window	woods	
fence	drive in theater	railroad crossing	lock			
fire hydrant	drydock	railroad spur	open water			
flagpole	factory	railroad track	pier/wharf/quay			
flare pipe	feed lot	railroad turntable	reservoir			
fountain	ferry crossing	ramp	river/stream			
free-standing sign	firing range	sidewalk	seawall			
gate	gas station	street	slipway/patent/slip			
highway sign	golf course	toll gate	sluice gate			
lantern	grain bin/silo	track road	water intake tower			
light standard/lamp post	heliport	trail	waterfall			
maintenance hole	hut	train/metro station				
monument	mobile home park	tunnel				
oil well	park					
oil/gas tank	parking area					
outside staircase	parking deck					
pile/piling/post	power plant					
pipeline	processing plant					
pole	pumping station					
postbox	quarry					
power pylon/tower	race track					
powerline	railroad yard					
rubbish box/trashcan	rig superstructure					



Urban Entities	Buildings/Sites	Road/Transportation	Water/Marine Objects	Building Components	Terrain	Vegetation
rubbish bunker/dumpster solar panels swimming pool taxiway telephone telephone pole tower comms tower noncomm traffic light wall waste pile watch tower/revetment water pump water tower water well	scrapyard stadium/amphitheater storage bunker/depot/warehouse substation telephone house transformer station vineyard windmill					

A.4 SYSTEM EVALUATION

In cooperation with NGA, a formal experiment to evaluate URGENT object recognition technologies will be conducted prior to the conclusion of Phase 1. The Government will create a performance evaluation team responsible for conducting this evaluation. The results of the URGENT Phase 1 experiment will strongly impact the scope and direction of URGENT Phase 2.

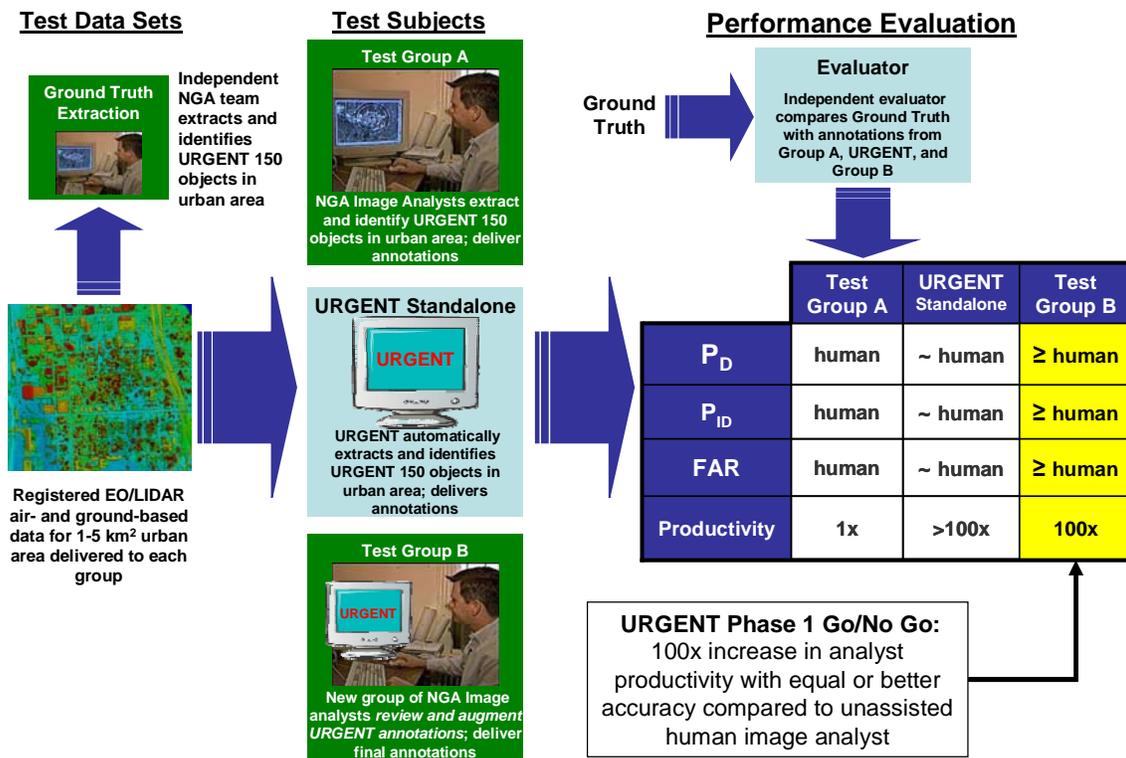


Figure 1. URGENT System Evaluation Plan

As illustrated in Figure 1, three distinct test subject groups will be evaluated during URGENT Phase 1. First, image analysts from NGA will be given registered EO/LIDAR data for an urban area and the task of extracting and identifying objects from the URGENT 150. Second, exploiting the same test data, the URGENT system will be employed to automatically extract and identify objects from the URGENT 150. Finally, a second group of NGA image analysts will extract and identify objects from the URGENT 150 assisted by the output of the URGENT system. The resulting annotations from each subject — Test Group A, Test Group B, and URGENT — will be scored against the “ground truth” annotations of a government independent evaluation group. Note: If multiple integrated teams are selected for URGENT Phase 1, the URGENT system developed by each team will be tested independently.



The accuracy of all subjects will be assessed according to both their ability to extract (measured in terms of Probability of Detection, P_D) and identify (measured in terms of Probability of Identification, P_{ID}) URGENT 150 objects present in the test area. In addition, the number of incorrect extractions (measured in terms of False Alarm Rate, FAR) will be assessed for all subjects.

As a guideline only, Table 3 provides an estimate of the minimum probability of detection, probability of identification, and the false alarm rates URGENT should achieve.

	P_{ID}	Object Size	P_D	FAR
Phase I	.85	1m ³	.7	10/.01km ²
		10m ³	.8	10/.1km ²
		100m ³	.9	10/1km ²

Table 3. URGENT Phase 1 Evaluation Metrics Guidelines

Another critical metric is productivity: the time required to deliver the completed image annotation product. The URGENT Phase 1 goal is to achieve a *100x increase in analyst productivity with equal or better accuracy compared to the unassisted human image analyst*. Meeting this challenge places emphasis not only on the accuracy of the URGENT system, but also on its computation time. Proposers must describe in detail how they propose to attain the accuracy and productivity performances needed to achieve the URGENT Phase 1 goal. Proposers are also requested to provide more detailed evaluation metrics of their technical approaches.

Graphical user interface (GUI) developed is not a major component of URGENT, but developers are required to be able to display their identified objects in 3D to support Test Group B geospatial analyst/URGENT system interaction. Offerors' results should be compliant with Open Geospatial Consortium (<http://www.opengeospatial.org/>) file format standards.

A.5 PROGRAM SCOPE AND FUNDING

The Government intends to issue awards based on the optimum combination of proposals that offers the best overall value to the Government. The Government reserves the right to award without discussions. The Government reserves the right to select for award all, some, or none of the proposals received in response to this BAA. The Government also reserves the right to select for award some portion(s) of the proposals received; in that event, the Government may select for negotiation all, or portions, of a given proposal. The Government may incrementally fund any award issued under this BAA.

It is anticipated that this effort will consist of multiple integrated teams. *Collaboration between academic and industrial organizations is strongly encouraged.*



While the earliest anticipated award is planned to occur in June 2007, the Government may select for funding any full proposal or portions of a proposal at any time before the closing date of this BAA.

A.6 PERIOD OF PERFORMANCE

The period of performance for URGENT Phase 1 has not been fixed at this time. Rather, Proposers are encouraged to provide their best estimates for the time and resources needed for meeting the challenge described in section A.4, as well as the basis of that estimate. The intent of this effort is to develop and experimentally validate the object recognition capabilities of the URGENT system in the smallest realistic amount of time. Reasonableness of schedules in planning, executing, and managing the program will be evaluated to ensure they are appropriate for the proposed development in URGENT Phase 1 as described in this PIP.

In addition to the base program focused on the development of urban object recognition from EO and LIDAR sensor data, Proposers may offer associated research/tasks investigating closely related areas. For example, detection of change in urban areas and the exploitation of other sensor phenomenologies (e.g., multipectral/hyperspectral and RADAR) for urban object recognition would be of interest. Proposals for such non-core research shall be submitted against the DARPA IXO Office-wide BAA 07-15, entitled "Elusive Surface Target Engagement Technology", once available on FedBizOpps and Grants.gov.



B PROPOSAL MANAGEMENT

B.1 General Information

B.1.1 Definition of BAA

The information provided in this Proposer Information Package (PIP), in addition to that provided in the FedBizOpps BAA 07-13, constitutes a Broad Agency Announcement as contemplated in the FAR 6.102 (d)(2)(i). The FedBizOpps announcement and this document are available online at <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>

B.1.2 BAA Correspondence

DARPA will use electronic mail for all technical and administrative correspondence regarding this BAA. Administrative, technical or contractual questions must be sent via e-mail to baa07-13@darpa.mil. All requests must include the name, address, and phone number of a point of contact. All technical, contractual and administrative questions should include the originator's full name, email, postal address and phone number of the point of contact.

B.1.3 Briefing to Industry

DARPA hosted a Briefing to Industry as part of the BAA07-13 on 1 February 2007 in Arlington, VA. The purpose of this briefing was to outline the program objectives to potential Offerors within the BAA 07-13 technical areas. Attendance was not required to propose. Similarly, attendance will have no direct bearing on proposal evaluations. All briefing materials presented at the BTI will be made publicly available at <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>. Sample data is available for download at <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>.

B.1.4 Summary of Important Dates

1 February 2007	Briefing to Industry	http://dtsn.darpa.mil/ixo/solicitations.asp#0713
2 February 2007	BAA 07-13 Published	FedBizOpps
8 March 2007	Deadline for T-FIMS Registration	https://www.tfims.darpa.mil/baa/propacctreq.asp
19 March 2007	Proposals Due	http://dtsn.darpa.mil/ixo/solicitations.asp#0713
1 June 2007	Award Notification	Notional Date
4 – 6 June 2007	URGENT Program Kickoff Meeting	Notional Date
2 February 2008	BAA 07-13 Closes	

B.1.5 Frequently Asked Questions

All questions and answers of relevance to the community will be posted to a Frequently Asked Questions (FAQ) accessible at: <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>.



B.1.6 Proposal Abstracts

Proposal abstracts are NOT requested under BAA 07-13.

B.1.7 Contract Types

This BAA affords Proposers the choice of submitting proposals for the award of a Procurement Contract, Technology Investment Agreement, Other Transaction for Prototype Agreement, or other such appropriate award instrument. Grant and Cooperative Agreements proposals are not requested in response to this BAA. The Government reserves the right to negotiate the type of award instrument determined appropriate under the circumstances.

B.2 Period of Solicitation

This BAA will remain open from 2 February 2007 through 2 February 2008. The due date for proposal submission is 19 March 2007 (1200 EST). Proposals submitted after 19 March 2007 will be accepted, but are not likely to be funded during the first round of program funding.

B.3 Submission Guidelines

DARPA will employ an electronic upload process, the Technical Financial Information Management System (T-FIMS) Submission System, for proposal submissions under BAA 07-13. Performers may find guidance for proposal submission at: <http://dtsn.darpa.mil/ixo/solicitations.asp#0713>.

B.4 TFIMS Reporting Requirements

The T-FIMS interactive reporting system facilitates technical and expenditure reporting on line. Information on this system may be found at <http://www.tfims.darpa.mil/>. Proposers shall satisfy the T-FIMS reporting requirements presented at <http://www.tfims.darpa.mil/tfimsreqdoc.asp> as part of their proposed deliverables.

B.5 Proposer Registration

Organizations planning to submit proposals must register at <https://www.tfims.darpa.mil/baa/propacctreginit.asp>. Only the lead or prime organization should register. One registration per proposal should be submitted. This means that an organization wishing to submit to multiple technical topic areas should complete a single registration for each proposal. By registering, the Proposer has made no commitment to submit. The deadline for T-FIMS registration is 8 March 2007. Please note: if the registration date is missed, the offeror may not be able to upload their proposal by the published proposal submission due date.



B.6 Security

The Government requests that proposals submitted under BAA 07-13 be unclassified. URGENT will exploit both unclassified and FOUO data from unclassified sensors and produce unclassified and FOUO results. URGENT researchers developing fundamental science will be encouraged to disseminate their results via publications and web distribution.

Proprietary Data: All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the proposer's responsibility to clearly define to the Government what is considered proprietary in nature.

B.7 Human Use

Proposals selected for funding are required to comply with provisions of the Common Rule (32 CFR 219) on the protection of human subjects in research (<http://www.dtic.mil/biosys/downloads/32cfr219.pdf>) and the Department of Defense Directive 3216.2 (<http://www.dtic.mil/whs/directives/corres/html2/d32162x.htm>). All proposals that involve the use of human subjects are required to include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards, and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort.

For proposals involving "greater than minimal risk" to human subjects within the first year of the project, performers must provide evidence of protocol submission to a federally approved IRB *at the time of final proposal submission to DARPA*. For proposals that are forecasted to involve "greater than minimal risk" after the first year, a discussion on how and when the proposer will comply with submission to a federally approved IRB needs to be provided in the submission. More information on applicable federal regulations can be found at the Department of Health and Human Services – Office of Human Research Protections website (<http://www.dhhs.gov/ohrp/>).

Note: There may be Human Use requirements that may be administered by NGA during contract negotiations.



C PROPOSAL EVALUATION

C.1 General Considerations

Proposers are encouraged to submit concise, but descriptive proposals. The Government reserves the right to select for award all, some, or none of each of the proposals received in response to BAA 07-13 and to award without discussions. All responsible sources capable of satisfying the Government's needs may submit a proposal. Small Disadvantaged Businesses and Historically Black Colleges and Universities (HBCUs)/Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals; however, no portion of this BAA will be set aside for HBCU and MI participation due to the impracticality of reserving discrete or severable areas of technology for exclusive competition among these entities.

It is the policy of DARPA to treat all proposals as competitive information and to disclose the contents only for the purposes of evaluation. The Government may use selected support contractor personnel to assist in administrative functions only. For this solicitation, non-Government advisors from Schafer Corporation, Solers Incorporated, Science and Technology Associates, SET Associates Corporation, McNeil Technologies, and CACI International, who have signed appropriate non-disclosure and conflict of interest statements, may assist in the proposal administration (including: BAA 07-13 logging, copying, distributing, storing and securing, and organizing evaluation activities) when their assistance is required. However, they will not participate in the final source selection process.

Proposers are also advised that employees of commercial firms under contract to the Government may be used by DARPA agents to administratively process proposals, monitor contract performance, or perform other administrative duties requiring access to other contractors' proprietary information. These support contracts include nondisclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors or using such information for any purpose other than that for which it was furnished. By submission of its proposal, each Proposer agrees that proposal information may be disclosed to those non-Government personnel for the limited purposes stated above.

Proposers are advised that only contracting officers are legally authorized to contractually bind or otherwise commit the Government contracting officers.

C.2 Criteria for Awards

Each proposal will be evaluated on the merit and relevance of the specific proposal as it relates to the program rather than against other proposals for research in the same general area, since no common work statement exists. In order of importance, the proposal Evaluation Criteria includes: (1) Quality and Technical Merit; (2) Relevance of Proposed Approach to URGENT Program Goals; (3) Realism of Proposed Schedule; (4) Capabilities and Experience; (5) Relevance to URGENT Mission Objectives; and (6) Cost Realism and Reasonableness.



In accordance with FAR 35.016(e), and as reflected in the aforementioned proposal Evaluation Criteria, the primary basis for selecting proposals for award shall be technical, importance to agency programs, and funds availability. Cost realism and reasonableness shall also be considered to the extent appropriate as described herein. Proposals may be evaluated as they are received, or they may be collected and periodically reviewed. The following are descriptions of the above listed criteria:

C.2.1 Quality and Technical Merit

- Understanding of the current state of the art
- Degree of innovation and potential for revolutionary advance
- Empirical and/or analytical provided in support for technical approach
- Justification of design choices as compared to alternative techniques

C.2.2 Relevance of Approach to URGENT Program Goals

- Consistency with the URGENT program concepts
- Depth and specificity of the proposed effort's system and program concepts
- Precision and coverage of the proposed effort's metrics

C.2.3 Realism of Proposed Schedule

- Extent to which the timeline of the proposed effort aggressively pursues the defined performance metrics
- Realism of scope of tasks
- Reasonableness of timeline

C.2.4 Capabilities and Experience

- Qualifications of proposed technical personnel
- Success on previous efforts in the relevant technology areas
- Availability of personnel over the duration of the proposed effort
- Adequacy of proposed facilities
- Adequacy of security plan

C.2.5 Relevance to URGENT Mission Objectives

- Degree of impact on the technical objectives of the URGENT program
- Degree of impact on military operations involving image analysis
- Familiarity with current and previous work on automated image analysis systems
- Technical and functional compatibility with the relevant operational environments
- Absence or significant mitigation of intellectual property restrictions



C.2.6 Cost Realism and Reasonableness

- The total cost relative to benefit
- The realism of cost levels for facilities and staff
- The cost-effective use of existing equipment and software
- Competitive costs on procurements

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort. Award(s) may be made to any proposer(s) whose proposal(s) is determined selectable regardless of its overall rating.

NOTE: PROPOSERS ARE CAUTIONED THAT EVALUATION SCORES MAY BE LOWERED AND/OR PROPOSALS REJECTED IF SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.



D PROPOSAL CONTENT

D.1 General Information

Technical and cost proposals must be submitted as 2 separate volumes (Volume I Technical, Volume II Cost), and must be valid for 180 days post submission.

All eligible sources may submit a proposal that shall be considered against the criteria set forth in Section C. Proposals with fewer than the maximum number of pages will not be penalized. Proposals exceeding the page limit will not be reviewed beyond the maximum page limit. Non-cost information incorporated into the unrestricted size Volume II cost proposal will not be considered. Proposers are encouraged to submit concise, but descriptive, proposals.

Proposal questions should be handled according to the process described in Section B. Proposers are advised that only contracting officers are legally authorized to contractually bind or otherwise commit the Government.

Proposers should apply the restrictive notice prescribed in the provision at FAR 52.215-1e, Restriction on Disclosure and Use of Data, to trade secrets or privileged commercial and financial information contained in their proposals.

D.2 Proposal Format

All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. The maximum total length of Volume I (technical proposal), Sections I, II and III is forty (40) pages including all figures, tables, and charts. There is no page limitation applicable to Volume II (Cost Proposal). All submissions must be in English. A Proposer may submit more than one proposal. Information or data contained in a proposal, deemed proprietary by the Proposer, should be clearly marked.



E TECHNICAL PROPOSAL

There is a 37 page limit for the technical proposal (not inclusive of cover sheets). The URGENT technical proposal shall consist of three sections as follows.

E.1 Section I – Summary of Proposal

{1 page} **Innovative Claims:** This page is the centerpiece of the proposal and should succinctly describe the key discriminators of the proposed approach.

{3 pages} **Executive Summary:** This section should succinctly describe the uniqueness, innovation, and benefits of the proposed approach relative to the current state-of-art and alternate approaches. Define how this effort will systematically address the URGENT program goals. Explain how this proposal addresses this problem differently from current approaches and the significant gains due to its uniqueness.

E.2 Section II – Detailed Proposal Information

{15 pages} **Technical Approach:** Clear description of the technical challenges, the technical approach proposed to address these challenges, empirical and/or analytical evidence in support of the approach, the experimentation plan for validating the approach, and the success criteria for the approach. Include a thorough quantitative discussion of relevant technical information. Describe the key technical progress elements central to the proposed effort and a detailed plan for developing them including key intermediate milestones. State data collection requirements (e.g., number of object instances required for each object, view angle restrictions, etc.) required to support the development of the proposed approach. Explain technical rationale for why the proposed technical approach is possible today and a constructive plan for accomplishment of technical goals. Include a concise presentation of the technical risks and the mitigation plan for each risk identified.

{2 pages} **Background:** Comparison of technical approach with other ongoing research and development, indicating advantages and disadvantages of the proposed effort.

{5 pages} **Statement of Work:** Outline of the scope of the effort, citing specific tasks to be performed, references to specific subcontractors if applicable, and clear contractor requirements. Do not include any proprietary information in the SOW.

{2 pages} **Project Management:** Description of the proposed approach to management of the project, including an organization chart showing reporting relationships, statements of the responsibilities of the team members, and the teaming strategy.

{2 pages} **Schedule:** Graphic representation of project schedule including detail down to the individual effort level. This should include a development plan that demonstrates a clear understanding of the proposed research; and a plan for periodic and increasingly robust experiments over the project life that will show applicability to the overall program concept. Tasks defined in the Statement of Work should align with tasks shown in Schedule. Show all project milestones. Include an estimated timeline for the identification of all objects in the URGENT 150, detailing which objects will be



recognized at what time over the course of the project. If not all objects in the URGENT 150 objects will be pursued, this should be noted and explained here.

{3 pages} **Personnel and Qualifications:** List of key personnel, concise summary of their qualifications, and discussion of proposer’s previous accomplishments and work in this or closely related research areas. Indicate the level of effort (including percentage of time allocations) to be expended by each person during each contract year and other (current and proposed) major sources of support for them and/or commitments of their efforts. DARPA expects all key personnel associated with a proposal to make substantial time commitment to the proposed activity.

{2 pages} **Deliverables:** Detailed description for each proposed deliverable to include expected delivery date. Note: proprietary claims to be explained in greater detail in section on Intellectual Property. If there are no proprietary claims, this should be stated.

{1 page} **Facilities:** Description of the facilities that would be used for the proposed effort. If any portion of the research is predicated upon the use of Government Owned Resources of any type, the proposer should specifically identify the property or other resource required, the date the property or resource is required, the duration of the requirement, the source from which the resource is required, if known, and the impact on the research if the resource cannot be provided. If no Government Furnished Property is required for conduct of the proposed research, the proposal shall so state.

{1 page} **Cost Summary:** A schedule of the estimated cost for each major task in each phase or option of the effort and a schedule of the proposed company cost share. Use format shown in Tables 5 and 6). “Technical labor” includes designers, software engineers, analysts, and other staff with degrees in science or engineering who contribute directly to the technical objectives of the program. “Administrative labor” includes contractual, financial, secretarial, and other staff with non-technical degrees who support the technical staff.

Cost Element	GFY 07	GFY 08	GFY 09	GFY 10	GFY 11
Technical labor	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Administrative labor	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Other direct charges	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Indirect charges	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Fee	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Total	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx

Table 5. Summary of funding request by cost element.



Organization	GFY 07	GFY 08	GFY 09	GFY 10	GFY 11
Prime	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Subcontractor A	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Subcontractor B	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Subcontractor C	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx
Total	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx	\$x,xxx,xxx

Table 6. Summary of funding request by performing organization.

Viewgraph Summary: Proposers are encouraged, but not required, to submit a technical viewgraph summary of their proposals in MS PowerPoint format as part of the Technical Volume. Although these will not be considered as part of the volume page count, Proposers should limit themselves to six viewgraphs or fewer.

This summary submission can be made either by emailing the PowerPoint presentation to baa07-13@darpa.mil, or by sending a compact disk by mail to:

Defense Advanced Research Projects Agency (DARPA)
ATTN: BAA07-13, DARPA/IXO, Dr. Todd Hughes
3701 North Fairfax Drive, Suite 611
Arlington, VA 22203-1714

When sending a technical viewgraph summary by email, please place the title of the proposed effort, as well as the assigned DARPA control number for the proposal submission, in the subject line. If the viewgraph summary is submitted via mail or courier, please make sure the title of the proposed effort, as well as the assigned DARPA control number for the proposal submission, accompanies the disk. *Without providing DARPA with this information, your viewgraph summary cannot be successfully linked to your proposal submission*, which must be uploaded via the T-FIMS Proposal Submission System, as described in Section B of this document.

E.3 Section III – References

The Proposer may provide a bibliography of relevant technical papers and research notes (published and unpublished) that document the technical ideas upon which the proposal is based. Properly marked copies of papers may also be included, however, DARPA is under no obligation to review and evaluate the papers. The bibliography and copies of relevant technical papers are not included in the official page count, but are requested to be reasonably limited.



F COST PROPOSAL

There is no page limit for the cost proposal. It should contain a cover sheet and three sections.

F.1 Cover Sheet

- a. Name and address of Proposer (include zip code);
- b. Name, title, and telephone number of Proposer's point of contact;
- c. Award instrument (Task Order subcontract) requested: fixed-price payable milestone, time-and-materials, or cost-plus-fixed-fee;
- d. Place(s) and period(s) of performance;
- e. Funds requested from DARPA for the Base Effort, each option and the total proposed cost; and the amount of cost share (if any);
- f. Name, mailing address, telephone number and Point of Contact of the Proposers cognizant government administration office (i.e., Office of Naval Research (ONR) - if requesting a grant, or Defense Contract Management Agency (DCMA) - if requesting other than a grant) (if known);
- g. Name, mailing address, telephone number, and Point of Contact of the Proposer's cognizant government audit agency (i.e. Department of Health and Human Services (DHHS) - if requesting a grant, or Defense Contract Audit Agency (DCAA) - if requesting other than a grant) (if known);
- h. Any Forward Pricing Rate Agreement, other such Approved Rate Information, or such other documentation that may assist in expediting negotiations (if available);
- i. Contractor and Government Entity (CAGE) Code;
- j. Dun and Bradstreet (DUN) Number;
- k. North American Industrial Classification System (NAICS) Number [NOTE: This was formerly the Standard Industrial Classification (SIC) Number];
- l. Taxpayer Identification Number (TIN);
- m. All subcontractor proposal backup documentation to include items a. through l. above, as is applicable and available. All proprietary subcontractor proposal documentation of which cannot be uploaded to TFIMS shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the Proposer or by the subcontractor organization;
- n. Proposal expiration date (validity period).

F.2 Section I – Detailed Cost Breakdown

The detailed cost breakdown is to include:



- Total program cost broken down by months within a government fiscal year (GFY) [Note: Government Fiscal Year runs from October 1st to September 30th] and Base and Options; further broken down by major cost items (direct labor by category, subcontracts, materials, travel, other direct costs, overhead charges, etc.). See Table 7 for an example format;
- Costs of major program tasks (WBS) by year and month (See Tables 7 and 8 below - also see FAR Par 15, Table 15-2 for suggested formats/content for cost proposals exceeding the threshold for certified cost and pricing);
- An itemization of major options (labor by category, travel, materials and other direct costs) and equipment purchases by year and month;
- An itemization of major subcontracts (labor by category, travel, materials and other direct costs) and equipment purchases;
- A summary of projected funding requirements by month (see Table 8);
- The source, nature, and amount of any industry cost sharing, if applicable. Where the effort consists of multiple phases that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

F.3 Section II – Supporting Cost and Pricing Information

Provide supporting information in sufficient detail to substantiate the cost estimates above. Include a description of the method used to estimate costs and supporting documentation. Provide the basis of estimate for all proposed labor rates, indirect costs, overhead costs, other direct costs and materials, as applicable.

Table 7. Example Detailed Cost Format (detailed by 3rd level WBS if proposal is over \$550K)

*

BASE	GFY xx												GFY yy												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Direct Labor - Dollars*																									
Direct Labor - Hours*																									
Travel																									
Equipment																									
Subcontractors																									
Sub 1**																									
Sub 2																									
Other ODCs																									
Overhead																									
G&A																									
Fee/Profit																									
Total																									

*Note: Breakout shall be by labor category.

**Note: Further breakout of cost elements (e.g., labor hours by category, labor dollars by category, travel, equipment, etc.) for each subcontractor is required.



Table 8. Example Cost Summary Format

	GFY 04											GFY 05														
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
BASE																										
OPTION 1																										
OPTION 2																										
Total																										

F.4 Section III – Intellectual Property (IP)

F.4.1 Noncommercial Items: (Technical Data and Computer Software)

Proposers responding to this BAA shall identify all noncommercial technical data, and noncommercial computer software that it plans to generate, develop, and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights, and to assert specific restrictions on those deliverables. Proposers shall follow the format under DFARS 252.227-7017 for this stated purpose. In the event that Proposers do not submit the list, the Government will assume that it automatically has “government purposes rights” for a period of five (5) years from the date of award, to all noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, unless otherwise agreed to by the parties. Additionally it is understood that such rights will convert automatically to “unlimited rights” after such five (5) year period, notwithstanding any period of performance extensions that may result after the award instrument is executed, unless otherwise agreed to by the parties. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the Proposer, as may be necessary, to evaluate the Proposer’s assertions. If no restrictions are intended, then the Proposer should state “NONE.”

A sample list for complying with this request follows:

NONCOMMERCIAL			
Technical Data Computer Software to be Furnished with Restrictions	Basis for Assertion Note: Provide detailed narrative justification to support stated assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

F.4.2 Commercial Items: (Technical Data and Computer Software)

Proposers responding to this BAA shall identify all commercial technical data, and commercial computer software that may be embedded in any noncommercial deliverables contemplated under the research effort, along with any applicable



restrictions on the Government's use of such commercial technical data and/or commercial computer software. In the event that Proposers do not submit the list, the Government will assume that there are no restrictions on the Government's use of such commercial items. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the Proposer, as may be necessary, to evaluate the Proposer's assertions. If no restrictions are intended, then the Proposer should state "NONE."

A sample list for complying with this request follows:

COMMERCIAL			
Technical Data Computer Software to be Furnished with Restrictions	Basis for Assertion Note: Provide detailed narrative justification to support stated assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)



G PROCUREMENT INTEGRITY, STANDARDS OF CONDUCT, ETHICAL CONSIDERATIONS, AND ORGANIZATIONAL CONFLICTS OF INTEREST (OCIS)

Certain post-employment restrictions on former federal officers and employees may exist, including special Government employees (including but not limited to Sections 207 and 208 of Title 18, United States Code, the Procurement Integrity Act, 41 U.S.C. 423, and FAR 3.104). Accordingly, it has been confirmed that the DARPA Program Manager responsible for this BAA is not assigned under the IPA program and, as such, is unlikely to have a potential conflict of interest with any potential offerors. However, prior to the start of proposal evaluations, the Government will assess whether any potential conflict of interest exists in regards to the DARPA Program Manager as well as those individuals chosen to evaluate proposals received under this BAA.

All proposers and proposed sub-contractors must affirm whether they are providing scientific, engineering, and technical assistance (SETA) or similar support to any DARPA technical office(s) through an active contract or subcontract, including those such contracts being managed by outside DARPA contracting agents. All affirmations must state which office(s) the proposer supports and identify the prime contract numbers. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5.) must be disclosed. The disclosure shall include a description of the action the proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict (e.g., Mitigation Plan). Should the Government determine that a potential organizational conflict of interest exists of which the offeror did not provide a mitigation plan, such plan may be requested by the Government during proposal evaluation(s).

If the situation cannot be mitigated by the contractor, the proposal may be returned without technical evaluation and withdrawn from consideration for award under this BAA.

H SUBCONTRACTING

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. 637(d)), it is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to contractors performing work or rendering services as prime contractors or subcontractors under Government contracts, and to assure that prime contractors and subcontractors carry out this policy. Each Proposer who submits a contract proposal and includes subcontractors is required to submit a subcontracting plan IAW FAR 19.702(a) (1) and (2) should do so with the submitted proposal. The plan format is outlined in FAR 19.704.



I AWARD ADMINISTRATION INFORMATION

- (1) Central Contractor Registration. Selected Proposers not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to any award under this BAA. Information on CCR registration is available at <http://www.ccr.gov>.
- (2) Representations and Certifications. In accordance with Federal Acquisition Regulation 4.1201, prospective Proposers shall complete electronic annual representations and certifications at <http://orca.bpn.gov>.
- (3) Wide Area WorkFlow (WAWF). Unless using another approved electronic invoicing system, performers will be required to submit invoices for payment directly via the Internet/WAWAF at <http://wawf.eb.mil>. Registration to WAWF will be required prior to any award under this BAA.

J EXPORT LICENSES

The following provision will be incorporated into any resultant contract:

Should this project develop beyond fundamental research (basic and applied research ordinarily published and shared broadly within the scientific community) with military or dual-use applications, the following apply:

- 1) The contractor shall comply with all U. S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.
- 2) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technical data or software.
- 3) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.
- 4) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.