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2. CONTRACT (HR0011-10-C-01	Proc. Inst. Ident.) NO. 108	3. EFFECTIVE DA	TE 14 Jul	2010		4. REQU 2666/00	ISIT ION/PURC	CHASE REQUEST/P	ROJECT NO.	
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17. [X] CONTRACTOR'S NEGOTIATED AGREEMENT Contractor is required to sign this document Contractor is required to sign this document Your offer on Solicitation Number items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. Contractor is required to sign this documents Your offer on Solicitation Number items or perform all the services set forth or otherwise identified above and on any continuation sheets for the considerations and obligations of the parties to this Is [] AWARD (Contractor is not required to sign this documents) Your offer on Solicitation Number icense or perform all the 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. Is entities of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.					97 95					
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TOTAL

Section B - Supplies or Services and Prices

CONTRACT LINE ITEM NO. (CLIN)	SUPPLIES/SERVICES	ESTIMATED COST	FIXED FEE	ESTIMATED COST PLUS FIXED FEE
0001	Basic - META Program, Phase 1a	(b)(4)	(b)(4)	\$3,693,699.00
	The Contractor shall perform the META Program, Phase 1a in accordance with Section III.A.1 of Attachment No. 1 - Statement of Work, and Section C-1 of the Contract. Technical data, reports,			

000101 Funding for CLIN 0001 AO No. Z666/00 ACRN AA: \$3,693,699.00

Contract.

0002 OPTION Option 1 - META Program, Phase 1b

and other deliverables are not separately priced and shall be provided to the Government in accordance with Sections C-2, F-2, F-3, and Attachment No. 1 of the

The Contractor shall perform the META Program, Phase 1b in accordance with Section III.A.2 of Attachment No. 1 -Statement of Work and Section C-1 of the Contract. Technical data, reports, and other deliverables are not separately priced and shall be provided to the Government in accordance with Sections C-2, F-2, F-3, and Attachment No. 1 of the Contract.

(b)(4)

(b)(4)

\$9,461,917.00

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0003 OPTION Option 2 - META Program, Phase 2

The Contractor shall perform the META Program, Phase 2 in accordance with Section III.A.3 of Attachment No. 1 - Statement of Work and Section C-1 of the Contract. Technical data, reports, and other deliverables are not separately priced and shall be provided to the Government in accordance with Sections C-2, F-2, F-3, and Attachment No. 1 of the Contract.



\$22,492,267.00

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Section C - Descriptions and Specifications

CLAUSES INCORPORATED BY FULL TEXT

C-1 Scope of Work

(a) <u>BASIC</u>: The Contractor shall furnish the necessary personnel, materials, facilities and other services as may be required to perform Contract Line Item Number (CLIN) 0001 in accordance with Section III.A.1 of the Statement of Work for META Program, Phase 1a. A copy of the Statement of Work is incorporated into the Contract as Attachment No. 1.

(b) <u>OPTION 1</u>: In the event that the Government elects to exercise Option 1, the Contractor shall furnish the necessary personnel, materials, facilities and other services as may be required to perform CLIN 0002 in accordance with Section III.A.2 of Attachment No. 1, Statement of Work for META Program, Phase 1b.

(c) <u>OPTION 2</u>: In the event that the Government elects to exercise Option 2, the Contractor shall furnish the necessary personnel, materials, facilities and other services as may be required to perform CLIN 0003 in accordance with Section III.A.3 of Attachment No. 1, Statement of Work for META Program, Phase 2.

C-2 Reports and Other Deliverables

(a) The Contractor shall submit the following reports and other deliverables in accordance with the delivery schedule set forth in Section F. Reports and other deliverables shall be submitted in writing, as defined in FAR 2.101, or as specified below:

(1) R&D STATUS REPORT. This brief narrative, not to exceed five pages in length, shall contain the following:

- (i) For first report only; the date work actually started.
- (ii) Description of progress during the reporting period, supported by reasons for any change in approach reported previously
- (iii) Planned activities and milestones for the next reporting period.
- (iv) Description of any major items of experimental or special equipment purchased or constructed during the reporting period.
- (v) Notification of any changes in key personnel associated with the contract during the reporting period.
- (vi) Summary of substantive information derived from noteworthy trips, meetings, and special conferences held in connection with the contract during the reporting period.
- (vii) Summary of all problems or areas of concern.
- (viii) Related accomplishments since last report.
- (ix) Fiscal status, to include reporting of summary level financial data in the following format:

R&D STATUS REPORT PROGRAM FINANCIAL STATUS

Work Breakdown		Cumulative to Date			At Completion	
Structure or Task Element	Planned Expend	Actual Expend	% Budget Compl	At Compl	Latest Revised Estimate Remarks	

Subtotal:

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Management			
Reserve:	 		
Or			
Unallocated			
Resources:			
TOTAL:			

Note: Budget at completion changes only with the amount of any scope changes. (Not affected by underrun or overrun)

Based on currently authorized work:

\$

Is current funding sufficient for the current fiscal year (FY)? (Explain in narrative if "NO") YES NO

What is the next FY funding requirement at current anticipated levels?

Have you included in the report narrative any explanation of the above data and are they cross-referenced? YES NO

(2) FINAL TECHNICAL REPORT. The Contractor shall deliver a final report for Phase 1a upon completion of the basic Contract. Should the options be exercised, the Contractor shall also deliver individual final reports for the option Phases 1b and 2 upon completion of each option. Title pages shall include a disclaimer worded substantially as follows:

"The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressly or implied, of the Defense Advanced Research Projects Agency or the U.S. Government."

The Final Report summary shall include:

Task Objectives Technical Problems General Methodology (i.e., literature review, laboratory experiments, surveys, etc.) Technical Results Important Findings and Conclusions Significant Hardware Development Special Comments Implications for Further Research Standard Form 298, August 1998

(3) ADDITIONAL MISCELLANEOUS DATA DELIVERABLES. The Contractor shall also deliver those items listed in the Contract Attachment No. 1 - Statement of Work, as applicable. The Contractor shall adhere to the schedule, as applicable, contained in the Statement of Work. Presentation materials (hard and soft copy) for all briefings given to the Government shall be provided in the Contractor's format.

(b) Reports delivered by the Contractor in the performance of the Contract shall be considered "Technical Data" as defined in Section I Contract clauses entitled "Rights in Technical Data – Noncommercial Items" and "Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation."

(c) Bulky Reports shall be mailed by other than first-class mail unless the urgency of submission requires use of first-class mail. In this situation, one copy shall be mailed first-class and the remaining copies forwarded by less than first-class.

(d) All papers and articles published as a result of DARPA sponsored research shall include a statement reflecting the sponsorship. In addition, a bibliography of the titles and authors of all such papers are to be included in the Final Technical Report

(1) The cover or title page of each of the above reports or publications shall have the following citation:

Sponsored by Defense Advanced Research Projects Agency Tactical Technology Office (TTO) Program: META Issued by DARPA/CMO under Contract No. HR0011-10-C-0108

(2) The title page shall include a disclaimer worded substantially as follows:

"The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressly or implied, of the Defense Advanced Research Projects Agency or the U.S. Government."

(3) The Final Technical Report for Phase 1a must (i) be prepared in accordance with American National Standards Institute (ANSI) Standard Z39.18; (ii) include a Standard Form 298, August 1998; and (iii) be marked with an appropriate Distribution Statement.

(4) Distribution Statement B applies. "Distribution authorized to U.S. Government agencies only due to the inclusion of proprietary information and to prevent Premature Dissemination of potentially critical technological information. Other requests for this document shall be referred to DARPA Technical Office via email at tio@darpa.mil."

Note to Contractor: In accordance with the applicable Data Rights clauses(s), all proprietary information within the data deliverables shall be clearly identified/marked as such for each such occurrence (use of footnotes, or similar forms of reference, for purposes of such identification is encouraged).

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Section D - Packaging and Marking

CLAUSES INCORPORATED BY FULL TEXT

D-1 Packaging and Marking

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(a) All items shall be preserved, packaged, packed and marked in accordance with best commercial practices to meet the packing requirements of the carrier, and to ensure safe delivery at destination.

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Section E - Inspection and Acceptance

CLAUSES INCORPORATED BY FULL TEXT

E-1 Inspection and Acceptance

(a) Supplies/services will be inspected/accepted at destination by the Contracting Officer's Representative identified in Section G herein.

(b) Use of the DD 250 is required for submission of the Final Report only.

CLAUSES INCORPORATED BY REFERENCE

52.246-9	Inspection Of Research And Development (Short Form)	APR 1984
252.246-7000	Material Inspection And Receiving Report	MAR 2008

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Section F - Deliveries or Performance

CLAUSES INCORPORATED BY REFERENCE

52.247-34 F.O.B. Destination

NOV 1991

CLAUSES INCORPORATED BY FULL TEXT

F-1 Term of Contract

(a) The term of the basic Contract, CLIN 0001, commences on the effective date and continues through April 13, 2011.*

*An Advance Agreement to Incur Pre-Award Costs, dated May 17, 2010 is incorporated into the Contract as Attachment No. 3 under Section J of the Contract. The Advance Agreement addresses the allowability of costs associated with the Phase 1a effort (CLIN 0001).

(b) In the event that the Government elects to exercise Option 1, the period of performance for the option, as set forth in CLIN 0002, shall commence from the effective date of the option exercise through six (6) months thereafter.

(c) In the event that the Government elects to exercise Option 2, the period of performance for the option, as set forth in CLIN 0003, shall commence from the effective date of the option exercise through twelve (12) months thereafter

F-2 Reports and Other Deliverables

. .

F-3

Delivery of all reports and other deliverables shall be made to the addressee specified in F-3 entitled "Report Distribution" in accordance with the following:

Descrip	tion	Due Date
R&D St	atus Report	On a monthly basis, within fiftenn (15) days after the end of the previous reporting month
Final Te Final Te Final Te	echnical Report for Phase 1a echnical Report for Phase 1b echnical Report for Phase 2	Upon completion of the basic Contract, Phase 1a Upon completion of Option 1, Phase 1b Upon completion of Option 2, Phase 2
Addition	nal Miscellaneous Data Deliverables	See Attachment No. 1 - Statement of Work
Report I	Distribution	
(a)	DARPA/Tactical Technology Office (TTO) ATTN: Paul Eremenko	

(a) DARPA/Tactical Technology Office (110) ATTN: Paul Eremenko 3701 North Fairfax Drive Arlington, VA 22203-1714 Email: paul.eremenko@darpa.mil

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(one copy of every report and deliverable)

- (b) DARPA/Tactical Technology Office (TTO) ATTN: Assistant Director, Program Management (ADPM) 3701 North Fairfax Drive Arlington, VA 22203-1714 Email: adpm-tto@darpa.mil (one copy of the R&D Status Reports and Final Report)
- Mitch Wolff, Contracting Officer's Representative AFRL/RZPE
 1950 Fifth Street, Building 18 RZPE
 WPAFB, OH 45433-7251
 Email: James.Wolff2@wpafb.af.mil
 (one copy of every report and deliverable)
- (d) DARPA/Research Services 3701 North Fairfax Drive Arlington, VA 22203-1714 Email: ResearchServices@darpa.mil (one copy of the Final Report)
- (e) Defense Technical Information Center
 - (1) Email: TR@dtic.mil (one electronic copy of the Final Report, if unclassified) OR
 - Attn: DTIC-BCS
 8725 John J. Kingman Road, Suite 0944
 Fort Belvoir, VA 22060-0944
 (two hard copies of the Final Report, if unclassified)
- (f) DARPA/Contracts Management Office (CMO) ATTN: Christopher L. Glista 3701 North Fairfax Drive Arlington, VA 22203-1714 Email: reportscg@darpa.mil (one copy of the R&D Status Reports and Final Report)

Note 1: (a) through (f) – submissions of unclassified materials only. Submission of classified material shall be coordinated through DARPA/Security & Intelligence Directorate (SID) and/or Paul Eremenko, DARPA Program Manager, in accordance with the DD 254, as applicable.

Note 2: For the Final Technical Report(s), the Contractor must also comply with the distribution requirements of DFARS 252-235-7011, as applicable.

F-4 Notice Regarding Late Delivery

In the event the Contractor anticipates difficulty in complying with the Contract delivery schedule, the Contractor shall immediately notify the Contracting Officer in writing, giving pertinent details, including the date by which it expects to make delivery; PROVIDED, however, that this date shall be informational only in character and the receipt thereof shall not be construed as a waiver by the Government of any contract delivery schedule, or any rights or remedies provided by law or under this Contract.

Section G - Contract Administration Data

ACCOUNTING AND APPROPRIATION DATA

ACRN AA 9700400 1320 Z666 P0M30 2525 DPAC 0 5408 S12136 62303E \$3,693,699.00 (ARPA Order No. Z666/00) \$3,693,699.00

CLAUSES INCORPORATED BY FULL TEXT

G-1 Procuring Office Representative/Contracting Officer

(a) The Procuring Office Representative/Contracting Officer is Christopher L. Glista, DARPA/CMO, 3701 North Fairfax Drive, Arlington, VA 22203-1714, telephone: (571) 218-4405, and E-mail: christopher.glista@darpa.mil.

(b) Notwithstanding any other provision of this contract, the Contracting Officer is the only individual authorized to redirect the effort or in any way amend or modify any of the terms of this contract. If, as a result of technical discussions, it is desirable to alter contract obligations or statement of work, a modification must be issued in writing and signed by the Contracting Officer.

G-2 Electronic Submission of Payment Requests

(a) Invoices for goods received or services rendered under this contract shall be submitted electronically through Wide Area Work Flow – Receipt and Acceptance (WAWF):

(1) Vendors that have never used WAWF shall follow the directions in the WAWF Vendor Getting Started Guide available at the following website: http://www.dfas.mil/contractorpay/electroniccommerce/ wideareaworkflow.html. This website also contains links for Vendor training and practice. Additional support can be obtained by calling WAWF Customer Service at 866-618-5988.

(2) Back up documentation (such as timesheets, monthly status reports, etc.) can be included and attached to the invoice in WAWF. Attachments should be in PDF format, but Attachments created in any Microsoft Office product may be attached. Total limit for the size of files per invoice is 5 megabytes.

(b) The following information, regarding invoice routing DoDAAC's, must be entered for completion of the invoice in WAWF:

WAWF Invoice Type	Select Cost Voucher for all Cost or
Jaquing Office DeDAAC	
Issuing Office DoDAAC	HRUUII
Admin Office DoDAAC	S2401A
Service Approver DoDAAC (Cost Voucher)	S2401A
DCAA Office DoDAAC (Used on Cost Vouchers only)	HAA082
Paying Office DoDAAC	HQ0339

(c) Cost Vouchers from Contractors approved by DCAA for direct billing will be directly routed to DFAS. Cost Vouchers from Contractors not approved for direct billing will be routed to DCAA for approval before the Cost Voucher is routed to DFAS. All Final Cost Voucher submissions will be routed to the Service Approver for approval. The DCAA office for this award is:

DCAA Tri-State Branch Office (DoDAAC: HAA082) 250 Marquette Avenue, Suite 570 Minneapolis, MN 55401-1872 E-mail: dcaa-fao3191@dcaa.mil

(d) For each invoice/cost voucher submitted for payment, the contractor shall also e-mail the WAWF automated invoice notice directly to the following points of contact:

Name	<u>E-mail</u>	Phone	Role
Mitch Wolff	James.Wolff2@wpafb.af.mil	(937) 904-9644	COR
Christopher L. Glista	Christopher.glista@darpa.mil	(571) 218-4405	Contracting Officer

G-3 Delegation of Authority for Contract Administration

(a) DCMA Twin Cities is hereby designated as the Contracting Officer's authorized representative for administering this contract in accordance with current directives.

G-4 Contracting Officer's Representative (COR)

(a) Performance of work under this contract shall be subject to the technical direction of Mitch Wolff, AFRL/RZPE, located at 1950 Fifth Street, Building 18 RZPE, WPAFB, OH 45433-7251; telephone no.: (937) 904-9644; Email: James.Wolff2@wpafb.af.mil. Such technical direction includes those instructions to the Contractor necessary to accomplish the Statement of Work. The COR is not otherwise authorized to make any representations or commitments of any kind on behalf of the Contracting Officer or the Government. The COR does not have the authority to alter the Contractor's obligations or to change the specifications of the contract.

(b) Technical direction shall not include any direction which:

(1) Constitutes additional work outside the scope of work;

(2) Constitutes a change as defined in Section I contract clause entitled "Changes";

(3) In any manner causes an increase or decrease in the total estimated cost or the time required for contract performance; or

(4) Changes any of the stated terms, conditions, or specifications of the contract.

(c) A copy of the Contracting Officer's Representative designation memorandum is incorporated into the Contract as Attachment No. 2.

G-5 Payment Instructions for Multiple Accounting Classification Citations

(a) If there is more than one ACRN within a contract line item, the payment office will make payment using the oldest fiscal year appropriations first, exhausting all funds in the previous fiscal year before disbursing from the next fiscal year. In the event there is more than one ACRN associated with the same fiscal year, the payment amount shall be disbursed from each ACRN within a fiscal year in the same proportion as the amount of funding obligated for each ACRN within the fiscal year.

G-6 Incremental Funding

(a) The Contract is fully funded.

G-7 Payment of Cost and Fee

(a) As consideration for the proper performance of work required under this contract, the Contractor shall be paid as follows:

(1) Costs, as provided for under Section I contract clause titled "Allowable Cost and Payment" not to exceed the amount set forth as "Total Estimated Cost" in Section B, and subject further to those Section I clauses entitled "Limitation of Cost" or "Limitation of Funds".

(2) A fixed fee in the amount set forth as "Fixed Fee" in Section B, in accordance with the Section I contract clause entitled "Fixed Fee". The Contractor may bill on each invoice the amount of the fixed fee bearing the same percentage to the total fixed fee as the amount of cost billed bears to the total estimated cost.

Section H - Special Contract Requirements

CLAUSES INCORPORATED BY FULL TEXT

H-1 Type of Contract

(a) This is a Cost-Plus-Fixed-Fee, Completion Contract.

H-2 Public Release or Dissemination of Information

(a) With the exception of the work to be performed by University subcontractor(s) as noted at subparagraph (c) below, DARPA expects the work performed under this contract will NOT be fundamental research, and it is, therefore, subject to the following publication restrictions:

There shall be no dissemination or publication, except within and between the Contractor and any subcontractors, of information developed under this contract or contained in the reports to be furnished pursuant to this contract without prior written approval, which will be communicated to the Contractor by email through the DARPA Public Release Center (PRC) at PRC@darpa.mil. All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the Contractor. These restrictions must be flowed down to all subcontractors, with the exception of the subcontractors listed in paragraph (3) of this clause. Any publications shall incorporate an Acknowledgement of Support and Disclaimer in accordance with DFARs 252.235-7010.

(b) When submitting material for written approval for open publication as described in subparagraph (a) above, the Contractor must submit a request for public release request to the PRC and include the following information: 1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx 30 words), number of pages (or minutes of video) and document type (briefing, report, abstract, article, or paper); 2) Event Information: event type (conference, principle investigator meeting, article or paper), event date, desired date for DARPA's approval; 3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and 4) Contractor's Information: POC name, e-mail and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file formats may require additional processing time. Requests can be sent either via e-mail to PRC@darpa.mil or via hard copy to 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to www.darpa.mil/prc for information about DARPA's public release process.

(c) At this time, DARPA expects the work performed under this contract by the below listed University subcontractor(s) to be fundamental research, and it is, therefore, not subject to publication restrictions described in this Section H-2 and DFARS 252.204-7000. Papers resulting from unclassified contracted fundamental research are exempt from prepublication controls and requirements, pursuant to DoD Instruction 5230.27 dated October 6, 1987. Should the character of the research change during performance of this subaward so that the research is no longer considered fundamental, the contract between the prime and University subcontractor listed below will be modified to impose the restrictions on public release and dissemination of information that apply to those research efforts that are not considered fundamental research.

Subcontractor via BAE-Technology Solutions 1.1.1.1

<u>Statement of Work Title and Date</u> Adaptive, Reflective, Robust Workflow (ARRoW), dated February 2, 2010 (Phase 1a only)

H-3 Key Personnel

(a) The Contractor shall notify the Contracting Officer prior to making any change in key personnel. Key personnel are defined as follows:

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(b) The Contractor must demonstrate that the qualifications of the prospective personnel are equal to or better than the qualifications of the personnel being replaced. Notwithstanding any of the foregoing provisions, key personnel shall be furnished unless the Contractor has demonstrated to the satisfaction of the COR that the qualifications of the proposed substitute personnel are equal to or better than the qualifications of the personnel being replaced.

H-4 Restrictions on Printing

(a) Unless otherwise authorized in writing by the Contracting Officer, reports, data, or other written material produced using funds provided by this contract and submitted hereunder shall be reproduced only by duplicating processes and shall not exceed 5,000 single page reports or a total of 25,000 pages of a multiple-page report. These restrictions do not preclude the writing, editing, preparation of manuscript or reproducible copy of related illustrative materials if required as part of this contract, or incidental printing such as forms or materials necessary to be used by the Contractor to respond to the terms of the contract.

H-5 Invention Disclosure and Reports

(a) All written communications required by DFARS clause 252.227-7038, "Patent Rights - Ownership by the Contractor (Large Business)" (DEC 2007) shall be submitted to the Administrative Contracting Officer (ACO). All required reporting shall be accomplished using the i-Edison.gov reporting website: https://s-edison.info.nih.gov/iEdison/.

H-6 Contractor Representations and Certifications

(a) The Contractor's Representations and Certifications dated April 21, 2010 and a copy of the Contractor's Online Representations and Certifications (ORCA) effective from January 28, 2010 through January 28, 2011 are incorporated herein by reference.

H-7 Insurance Schedule

(a) The Contractor shall maintain the types of insurance listed in FAR 28.307-2 (a), (b) and (c), with the minimum amounts of liability indicated therein. The types of insurance coverage listed in paragraphs (d) and (e) shall also be maintained when applicable.

H-8 Travel

(a) Non-University/For-Profit Performers: Reimbursement for travel-related expenses shall be in accordance with the Contractor's approved travel policy. The Federal Travel Regulations, Joint Travel Regulations (JTR), and Standardized Regulations as stated in FAR 31.205-46 will be used as a guide in determining reasonableness of per diem costs. Costs for travel shall be allowable subject to the provisions of FAR 31.205-46.

(b) In connection with direct charge to the contract of travel-related expenses, the Contractor shall hold travel to the minimum required to meet the objectives of the contract, and substantial deviations from the amount of travel agreed to during contract negotiation shall not be made without the authorization of the Contracting Officer.

(c) Approval of the Contracting Officer shall be obtained in advance for attendance by personnel at training courses, seminars, and other meetings not directly related to contract performance if the costs for the courses, seminars, and other meetings are charged to the contract.

(d) All foreign travel shall be authorized and approved in advance, in writing, by the Contracting Officer. Request for such travel must be submitted to the Contracting Officer at least thirty (30) days in advance of traveler's anticipated departure date, and shall include traveler's itinerary of United States Flag Air Carriers.

H-9 Metric System

(a) The Defense Advanced Research Projects Agency (DARPA) will consider the use of the metric system in all of its activities consistent with operational, economical, technical and safety requirements.

(b) The metric system will be considered for use in all new designs. When it is deemed not to be in the best interest of the DoD to provide metric design, justification shall be provided.

(c) Physical and operational interfaces between metric items and U.S. customary items will be designed to assure that interchangeability and interoperability will not be affected.

(d) Existing designs dimensioned in U.S. customary units will be converted to metric units only if determined to be necessary or advantageous. Unnecessary retrofit of existing systems with new metric components will be avoided where both the new metric and existing units are interchangeable and interoperable. Normally, the system of measurement in which an item is originally designed will be retained for the life of the item.

(e) During the metric transition phase hybrid metric and U.S. customary designs will be necessary and acceptable. Material components, parts, subassemblies, and semi-fabricated material, which are of adequate or when it is otherwise specifically determined to be in the best interest of the Department of Defense. Bulk materials will be specified and accepted in metric units when it is expedient or economical to do so.

(f) Technical reports, studies, and position papers, (except those pertaining to items dimensioned in U.S. customary units) will include metric units of measurement in addition to or in lieu of U.S. customary units. With respect to existing contracts, this requirement applies only if such documentation can be obtained without an increase in contract costs.

(g) Use of the dual dimensions (i.e., both metric and U.S. customary dimensions) on drawings will be avoided unless it is determined in specific instances that such usage will be beneficial. However, the use of tables on the document to translate dimensions from one system of measurement to the other is acceptable.

H-10 Consent to Subcontract

(a) Pursuant to the clause of the General Provision entitled, "Subcontracts (JUN 2007)," FAR 52.244-2(j), the Contracting Officer hereby consents to the placement of subcontract(s) with the following firm(s):

Estimated Cost

NAME	Phase 1a	Phase 1b	Phase 2	<u>Total All</u> Phases
Subcontractors via BAE-TS (b)(4)	(b)(4)			

(b) Approval must be obtained from the Administrative Contracting Officer to increase/decrease the use of the listed subcontractors by greater than 20% from the level established in paragraph (a) above. Approval must also be obtained by the Administrative Contracting Officer prior to adding additional subcontractors not listed above.

H-11 Pre-contract Costs

(a) The extent of allowability of costs incurred by the Contractor prior to the effective date of the Contract shall be governed by the Advance Agreement to Authorize Incurrence of Pre-Award Costs listed in Section J as Attachment No. 3.

H-12 Small Business Subcontracting Plan

(a) The Contractor's Small Business Subcontracting Plan, dated April 21, 2010 along with an approved Master Subcontracting Plan (effective 1 December 2008 through 30 November 2011) is incorporated herein and made a part of this Contract by reference.

H-13 Proprietary Technical Data and Computer Software

(a) Any deliverable technical data or computer software developed or generated at private expense and considered to be proprietary by the Contractor or subcontractors shall be delivered in accordance with DFARS 252.227-7013 and 252.227-7014. No such data and/or software is incorporated into the Contract at this time.

(b) The Contractor anticipates that technical data and computer software to be delivered under Phase 2 of the contract will be provided to the Government with unlimited rights. Notwithstanding the foregoing, prior to exercise of the Phase 2 Option (CLIN 0003), the Contractor shall have the right to assert restrictions on the Government's use, release or disclosure of technical data and computer software to be delivered during Phase 2.

H-14 Contractor Code of Business Ethics

(a) The "agency Office of the Inspector General" referenced in FAR clause 52.203-13, "Contractor Code of Business Ethics" (DEC 2008) contained in Section I of this Contract, shall be the Department of Defense Office of the Inspector General (DoD OIG). Contact information is as follows:

Office of the Inspector General United States Department of Defense Investigative Policy and Oversight Contract Disclosure Program 400 Army Navy Drive, Suite 1037 Arlington, VA 22202-4704 Toll Free Telephone: 866-429-8011

H-15 Exercise of Options

(a) This Contract is renewable at the unilateral option of the Government. An Option shall be exercised by issuance of a modification for Option requirements, as set forth in Sections B and F.

H-16 Option to Extend the Term of the Contract

(a) The Government may extend the term of this Contract at any time prior to the expiration of the Contract term, provided that the Government shall give the Contractor a preliminary notice of its intent to extend at least seven (7) days before the Contract expires. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this clause.

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(c) Total duration of this Contract, including exercise of any options under this clause, shall not exceed sixty (60) months.

Section I - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	JUL 2004
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-6	Restrictions On Subcontractor Sales To The Government	SEP 2006
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or	JAN 1997
	Improper Activity	
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal	SEP 2007
	Transactions	
52.203-13	Contractor Code of Business Ethics and Conduct	DEC 2008
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.204-7	Central Contractor Registration	APR 2008
52.209-6	Protecting the Government's Interest When Subcontracting	SEP 2006
	With Contractors Debarred, Suspended, or Proposed for	
	Debarment	
52.215-2	Audit and RecordsNegotiation	MAR 2009
52.215-8	Order of PrecedenceUniform Contract Format	OCT 1997
52.215-10	Price Reduction for Defective Cost or Pricing Data	OCT 1997
52.215-12	Subcontractor Cost or Pricing Data	OCT 1997
52.215-14 Alt I	Integrity of Unit Prices (Oct 1997) - Alternate I	OCT 1997
52.215-15	Pension Adjustments and Asset Reversions	OCT 2004
52.215-16	Facilities Capital Cost of Money	JUN 2003
52.215-18	Reversion or Adjustment of Plans for Postretirement Benefits	JUL 2005
	(PRB) Other than Pensions	
52.215-21	Requirements for Cost or Pricing Data or Information Other	OCT 1997
	Than Cost or Pricing DataModifications	
52.215-23	Limitations on Pass-Through Charges	OCT 2009
52.216-7	Allowable Cost And Payment	DEC 2002
52.216-8	Fixed Fee	MAR 1997
52.219-8 (DEV)	Utilization of Small Business Concerns (DEVIATION)	MAY 2004
52.219-9 (Dev)	Small Business Subcontracting Plan (Deviation)	APR 2008
52.219-16	Liquidated Damages-Subcontracting Plan	JAN 1999
52.219-28	Post-Award Small Business Program Rerepresentation	APR 2009
52.222-2	Payment For Overtime Premiums	JUL 1990
52.222-3	Convict Labor	JUN 2003
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	MAR 2007
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of	fSEP 2006
	the Vietnam Era, and Other Eligible Veterans	
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans	SEP 2006
	Of The Vietnam Era, and Other Eligible Veterans	
52.222-50	Combating Trafficking in Persons	FEB 2009
52.222-54	Employment Eligibility Verification	JAN 2009
52.223-6	Drug-Free Workplace	MAY 2001
52.223-14	Toxic Chemical Release Reporting	AUG 2003
52.225-13	Restrictions on Certain Foreign Purchases	JUN 2008
52.227-1 Alt I	Authorization And Consent (Dec 2007) - Alternate I	APR 1984

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52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	DEC 2007
52.228-7	InsuranceLiability To Third Persons	MAR 1996
52.230-2	Cost Accounting Standards	OCT 2008
52.230-6	Administration of Cost Accounting Standards	MAR 2008
52,232-9	Limitation On Withholding Of Payments	APR 1984
52.232-17	Interest	OCT 2008
52.232-17	Limitation Of Cost	APR 1984
52.232.23 Alt I	Assignment of Claims (Ian 1986) - Alternate I	APR 1984
52,252-25 / MC 1	Prompt Payment	OCT 2008
52,232-23	Payment by Electronic Funds Transfer-Central Contractor	OCT 2003
52.252-55	Registration	001 2005
52 233-1	Disputes	ПП. 2002
52.233-3 Alt I	Protect After Award (Aug 1996) - Alternate I	IIN 1985
52.235-5 AIL I	Applicable I aw for Breach of Contract Claim	OCT 2004
52.233-4	Notice of Intent to Dicallow Costs	ADD 1084
52.242-1	Panalties for Unallowable Costs	MAV 2001
52.242-5	Certification of Final Indirect Costs	IAN 1007
52.242-4	Penkruntev	ЛИ 1997
52.242-15 52.242-15 Alt I	Stop Work Order (Aug 1080) Alternate I	ADD 1084
52.242-15 All 1	Stop-work Order (Aug 1969) - Alternate I Changes, Cost Boimburgement (Aug 1987) - Alternate V	APK 1984
52.245-2 Alt V	ChangesCost-Reinfoursement (Aug 1987) - Alternate V	APK 1904
52.245-0	Change Order Accounting	AFK 1904
52.244-2	Subcontracts	JUN 2007
52.244-5	Competition in Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Items	DEC 2009
52.245-1 (Dev)	Government Property (June 2007)	JUN 2007
52.245-9	Use And Charges	JUN 2007
52.246-23	Limitation Of Liability	FEB 1997
52.247-63	Preference For U.S. Flag Air Carriers	JUN 2003
52.249-6	Termination (Cost Reimbursement)	MAY 2004
52.249-14	Excusable Delays	APK 1984
52.253-1	Computer Generated Forms	JAN 1991
252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7000	Officials	JAN 2009
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-	DEC 2008
	Contract-Related Felonies	
252.203-7002	Requirement to Inform Employees of Whistleblower Rights	JAN 2009
252.204-7000	Disclosure Of Information	DEC 1991
252.204-7002	Payment For Subline Items Not Separately Priced	DEC 1991
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	Central Contractor Registration (52.204-7) Alternate A	SEP 2007
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By	DEC 2006
	The Government of a Terrorist Country	
252.211-7003	Item Identification and Valuation	AUG 2008
252.211-7007	Reporting of Government-Furnished Equipment in the DoD	NOV 2008
	Item Unique Identification (IUID) Registry	
252.215-7000	Pricing Adjustments	DEC 1991
252.215-7002	Cost Estimating System Requirements	DEC 2006
252.215-7004	Excessive Pass-Through Charges	MAY 2008
252.219-7003 (Dev)	Small Business Subcontracting Plan (DoD Contracts)	APR 2007
Alt I	(Deviation) Alternate I	

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252.222-7999 (Dev)	Additional Requirements and Responsibilities Restricting the	FEB 2010
	Use of Mandatory Arbitration Agreements (Deviation)	
252.225-7006	Quarterly Reporting of Actual Contract Performance Outside	MAY 2007
	the United States	
252.225-7012	Preference For Certain Domestic Commodities	DEC 2008
252.226-7001	Utilization of Indian Organizations and Indian-Owned	SEP 2004
	Economic Enterprises, and Native Hawaiian Small Business	
	Concerns	
252.227-7013	Rights in Technical DataNoncommercial Items	NOV 1995
252.227-7014	Rights in Noncommercial Computer Software and	JUN 1995
	Noncommercial Computer Software Documentation	
252.227-7015	Technical DataCommercial Items	NOV 1995
252.227-7016	Rights in Bid or Proposal Information	JUN 1995
252.227-7019	Validation of Asserted RestrictionsComputer Software	JUN 1995
252.227-7025	Limitations on the Use or Disclosure of Government-	JUN 1995
	Furnished Information Marked with Restrictive Legends	
252.227-7027	Deferred Ordering Of Technical Data Or Computer Software	APR 1988
252.227-7030	Technical DataWithholding Of Payment	MAR 2000
252.227-7037	Validation of Restrictive Markings on Technical Data	SEP 1999
252.227-7038	Patent RightsOwnership by the Contractor (Large Business)	DEC 2007
252.231-7000	Supplemental Cost Principles	DEC 1991
252.232-7003	Electronic Submission of Payment Requests and Receiving	MAR 2008
	Reports	
252.232-7010	Levies on Contract Payments	DEC 2006
252.235-7011	Final Scientific or Technical Report	NOV 2004
252.242-7004	Material Management And Accounting System	JUL 2009
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.244-7000	Subcontracts for Commercial Items and Commercial	AUG 2009
	Components (DoD Contracts)	
252.247-7023	Transportation of Supplies by Sea	MAY 2002

CLAUSES INCORPORATED BY FULL TEXT

52.215-19 NOTIFICATION OF OWNERSHIP CHANGES (OCT 1997)

(a) The Contractor shall make the following notifications in writing:

(1) When the Contractor becomes aware that a change in its ownership has occurred, or is certain to occur, that could result in changes in the valuation of its capitalized assets in the accounting records, the Contractor shall notify the Administrative Contracting Officer (ACO) within 30 days.

(2) The Contractor shall also notify the ACO within 30 days whenever changes to asset valuations or any other cost changes have occurred or are certain to occur as a result of a change in ownership.

(b) The Contractor shall--

(1) Maintain current, accurate, and complete inventory records of assets and their costs;

(2) Provide the ACO or designated representative ready access to the records upon request;

(3) Ensure that all individual and grouped assets, their capitalized values, accumulated depreciation or amortization, and remaining useful lives are identified accurately before and after each of the Contractor's ownership changes; and

(4) Retain and continue to maintain depreciation and amortization schedules based on the asset records maintained before each Contractor ownership change.

The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirement of FAR 15.408(k).

(End of clause)

52.217-7 OPTION FOR INCREASED QUANTITY--SEPARATELY PRICED LINE ITEM (MAR 1989)

The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated in the Schedule. The Contracting Officer may exercise the option by written notice to the Contractor within <u>seven (7) days</u>. Delivery of added items shall continue at the same rate that like items are called for under the contract, unless the parties otherwise agree.

52.247-1 COMMERCIAL BILL OF LADING NOTATIONS (FEB 2006)

When the Contracting Officer authorizes supplies to be shipped on a commercial bill of lading and the Contractor will be reimbursed these transportation costs as direct allowable costs, the Contractor shall ensure before shipment is made that the commercial shipping documents are annotated with either of the following notations, as appropriate:

(a) If the Government is shown as the consignor or the consignee, the annotation shall be:

"Transportation is for the authorized contract supplies and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by, the Government."

(b) If the Government is not shown as the consignor or the consignee, the annotation shall be:

"Transportation is for the authorized contract supplies and the actual total transportation charges paid to the carrier(s) by the consignor or consignee shall be reimbursed by the Government, pursuant to cost-reimbursement contract no. HR0011-10-C-0108. This may be confirmed by contacting Christopher L. Glista at telephone no. (571) 218-4405."

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es): http://farsite.hill.af.mil/farsite_script.html

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (APR 1984)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any Defense Federal Acquisition Regulation (48 CFR Chapter 2) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

252.204-7006 BILLING INSTRUCTIONS (OCT 2005)

When submitting a request for payment, the Contractor shall--

(a) Identify the contract line item(s) on the payment request that reasonably reflect contract work performance; and

(b) Separately identify a payment amount for each contract line item included in the payment request.

(End of clause)

252.204-7008 EXPORT-CONTROLLED ITEMS (APR 2010)

(a) Definition. Export-controlled items, as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR parts 120-130). The term includes:

(1) Defense items, defined in the Arms Export Control Act, 22 U.S.C. 2778(j)(4)(A), as defense articles, defense services, and related technical data, and further defined in the ITAR, 22 CFR part 120.

(2) Items, defined in the EAR as ``commodities, software, and technology," terms that are also defined in the EAR, 15 CFR 772.1.

(b) The Contractor shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for Contractors to register with the Department of State in accordance with the ITAR. The Contractor shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

(c) The Contractor's responsibility to comply with all applicable laws and regulations regarding export-controlled items exists independent of, and is not established or limited by, the information provided by this clause.

(d) Nothing in the terms of this contract adds to, changes, supersedes, or waives any of the requirements of applicable Federal laws, Executive orders, and regulations, including but not limited to--

(1) The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, et seq.);

(2) The Arms Export Control Act (22 U.S.C. 2751, et seq.);

(3) The International Emergency Economic Powers Act (50 U.S.C. 1701, et seq.);

(4) The Export Administration Regulations (15 CFR parts 730-774);

(5) The International Traffic in Arms Regulations (22 CFR parts 120-130); and

(6) Executive Order 13222, as extended.

(e) The Contractor shall include the substance of this clause, including this paragraph (e), in all subcontracts.

(End of clause)

252.235-7010 Acknowledgment of Support and Disclaimer. (MAY 1995)

(a) The Contractor shall include an acknowledgment of the Government's support in the publication of any material based on or developed under this contract, stated in the following terms: This material is based upon work supported by the Defense Advanced Research Projects Agency under Contract No. HR0011-10-C-0108.

(b) All material, except scientific articles or papers published in scientific journals, must, in addition to any notices or disclaimers by the Contractor, also contain the following disclaimer: Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Defense Advanced Research Projects Agency.

Remarks:	
FAR 52.216-7	insert the word, "zero," in the space in subparagraph (a)(3).
FAR 52.219 - 28	Under paragraph (g), the Contractor represents that it is not a small business concern
	under NAICS Code 541712 assigned to contract number HR0011-10-C-0108.
FAR 52.222-2	insert the word, "zero," in the space marked with an asterisk (*) in paragraph (a).
FAR 52.244-2	insert the word, "N/A," in spaces under paragraphs (d) and (j).
DFARS 252.211-7003	insert the word, "N/A," in spaces under subparagraph (c)(1)(ii).

Section J - List of Documents, Exhibits and Other Attachments

Attachment No. 1	-	Statement of Work for META Program, dated July 1, 2010 (24 pages)
Attachment No. 2	-	Contracting Officer's Representative (COR) Designation Memorandum, dated April 7,
		2010 (3 pages)
Attachment No. 3	-	Advance Agreement to Authorize Incurrence of Pre-Award Costs, dated May 17, 2010
		(2 pages)

STATEMENT OF WORK FOR META

I. BACKGROUND

The goal of the META program is to reduce the development cycle time for complex cyber-physical systems (particularly aerospace and defense systems such as aircraft, rotorcraft, and ground vehicles) by a factor of 5x over current cycle times. The approach to this goal is to apply innovative technology that employs a model-based approach to the revolutionizing of the design and verification processes currently used throughout the aerospace industry. The objective of this project is to apply innovative technology the new infrastructure (toolset, models, and component/manufacturing data bases) needed and make this technology available to the industry. The intent is to subsequently use the results of the effort described in this Statement of Work (SOW) to demonstrate that application of the new approach and infrastructure meets the 5x improvement in cycle time through the development an actual new complex cyber-physical system in either the aircraft, rotorcraft, or land vehicle domain.

The META program will be structured in three phases, with the first phase consisting of two sub-phases:

Phase 1a: Design Flow, Metrics, and Tools Development (9 months)
Phase 1b: Toolset Implementation (6 months)
Phase 2: Component and Manufacturing Model Library Development (12 months)
Phase 3: Rapid Development Demo (15+ months)

This SOW addresses Phases 1a, 1b, and 2. Phase 3 will be the addressed a part of a subsequent program.

The structure of this SOW (Table III.A.-1) is derived from the directions in the Government BAA that requires each phase to be separately defined and requires the use of critical milestones to assess performance during execution of the program. Based on these requirements, the SOW and supporting Work Breakdown Structure (WBS) has been structured such that the top level (Section X/Level 1 of the SOW/WBS) specifies the phase of the META program (i.e., 1a, 1b, or 2), and the second level (Section X.Y/Level 2) aligns to the milestones in each phase. The third level (Section X.Y.Z/Level 3) captures the key development points in tasks underneath each milestone. The objectives and milestones for each phase are defined in the corresponding introduction to each phase in the SOW.

II. APPROACH

In order to achieve the >5x metric, a new model-based work flow named Adaptive, Reflective, Robust Workflow (ARRoW) will be implemented based on a novel concurrent design, testing, and validation workflow. The notional elements of the model-based systems engineering environment are the Engineering Management Environment, a central repository of all engineering artifacts; the Decision Support Environment, a set of tools that are used to assess progress by combining results from simulations with a variety of artifacts present in the central repository; and the modeling, simulation and analysis environment. ARRoW will dramatically enhance the modeling, simulation, and analysis environment, by incorporating and cross-correlating a component model repository consisting of models in abstraction layers of increasing fidelity, all analysis test and evaluation data, all diagnoses and design optimization, and an evolving and incrementally tightening probabilistic certificate of correctness.

Phase	Major Tasks Sections	Sub-Task Sections
	1.1	1.1.1 Metrics and Parameteric Model Development and Review
	Complexity Metric & Parametric Model	1.1.2 Metrics and Parameteric Model Updates
	1.2	1.2.1 Design, Integration & Validation Flow Development and Review
	Design, Integration & Validation Flow	1.2.2 Design, Integration & Validation Flow Updates
	13	1.3.1 Modeling Language Development and Review
	Modeling Language Development	1.3.2 Modeling Language Development Updates
Dhana 1a		1.4.1 Integrated Process Engineering
Phase la		1.4.2 Notional System Application Demo and Review
	Notional Demo Design Application	1.4.3 Integrated Process Engineering Updates
	1.5	1.5.1 Program Meetings
	Program Meetings and Reviews	1.5.2 Program Reviews
	1.6	1.6.1 Program Planning
· .	Program Management Planning,	1.6.2 Management Control
	Control, and Reports	1.6.3 Management Reports
· ·	2.1	2.1.1 Tool Design and Review
	Tool Design	2.1.2 Tool Design Updates
	2.2	2.2.1 Modeling Language & Library Requirements Development
and a second	Modeling Language & Library Requirements	2.2.2 Modeling Language & Library RequirementsUpdates
19	2.3 Notional Demo System Application	2.3.1 Integrated Process Maintenance
		2.3.2 Notional Demo System Application Demo and Review
Dhaco th		2.3.2 Integrated Process Engineering Update
Phase in	2,4	2.4.1 System Documentation
	Toolset Delivery	2.4.2 System Packaging and Toolset Delivery
a geologi	2.5	2.5.1 Program Meetings
1.1.1.1.1.	Program Meetings and Reviews	2.5.2 Program Reviews
	2.6	2.6.1 Program Planning
	Program Man agement Planning,	2.6.2 Management Control
21	Control, and Reports	2.6.3 Management Reports
	3.1	3.1.1 Component/Manufacturing Library Development Plan & Review
	Component/Manufacturing Library Development Plan	3.1.2 Component/Manufacturing Library Development Plan Udpates
$(-1) \in \mathbb{R}^{n}$	3.2 Notional Demo System Application	3.2.1 Integrated Process Maintenance
		3.2.2 Notional Demonstration System Application Plan and Review
		3.2.3 Integrated Process Engineering Updates
Dhana	33	3.3.1 Instantiated Component Models
Phase 2	Component/Manufacturing Library	3.3.2 Instantiated Manufacting Libraries
		3.3.3 Component/Manufacturing Library Delivery
1.111.00	3.4	2.4.1 Program Meetings
$1 \leq n \leq n \leq 1$	Program Meetings and Reviews	2.4.2 Program Reviews
	3.5	2.5.1 Program Planning
	Program Management Planning,	2.5.2 Management Control
	Control, and Reports	2.5.3 Management Reports

Table III.A-1. SOW Structure

Specifically, ARRoW will develop design flow, metrics for complexity and adaptability, tools, and models in order to substantially improve, by five times current speed, the design, integration/manufacturing, and verification phases of the development of complex cyber-physical systems. Aerospace and defense systems such as aircraft, rotorcraft, and ground vehicles are particular focus areas of the effort, and the solutions will be demonstrated up to and through the prototype stage. Significant advances are necessary in the following areas: measuring complexity and adaptability; modeling components and systems; designer-in-the-loop exploration of large-scale design spaces along non-traditional system decompositions; evaluating designs and making trades with respect to complexity, adaptability, and performance metrics; and applying probabilistic formal methods to the system verification problem in order to dramatically reduce the need for expensive real-world testing and design iteration.

End item deliverable of the effort will be the delivery of the integrated toolset developed, a Component and Manufacturing Library that will support the design effort in a Government specified domain (aircraft, rotorcraft, or land vehicle), and a set of user documentation associated with the toolset and library. In addition, there will be interim deliverables associated with development in each phase, and configuration management will be employed on those interim deliverables, as well as our final deliverables, as specified by our software development processes.

III.A.1 PHASE 1a

The objectives of Phase 1a are:

- (1) To develop a quantitative complexity metric usable for making design decisions.
- (2) To develop a quantitative metric of adaptability associated with a given system architecture that can support trade-offs between adaptability, complexity, performance, cost, schedule, risk, and other system attributes.
- (3) To develop a design flow for cyber-physical systems.
- (4) To be able to verify that the entire cyber-physical system will function correctly and estimate its reliability without resort to real-world testing.

This phase shall be 9 months duration with Milestones (SOW and WBS Level 2):

- (1) Complexity Metric and Parametric Model Review (ATP + 3 months)
- (2) Design, Integration, and Verification Flow Review (ATP + 5 months)
- (3) Modeling Language Review (ATP + 6 months)
- (4) Notional Demo System Application Review (ATP + 7 months)
- (5) Program Reviews and Phase 1a Final Review (ATP + 8 months)
- (6) Program Management Planning, Control, and Reports; Phase 1a Final Report (ATP + 9 months)

Approach: Contractor shall develop the META ARRoW design, integration, and verification flows; define the modeling language; define the complexity, robustness, and adaptability metrics and cost/schedule metrics; and demonstrate system capability by executing a reduced scope demonstration. This phase will be performed with BAE Systems in the lead role and will be supported by PARC, MIT, BBN, and PTC. The phase will be accomplished by analyzing model capabilities to determine metrics, developing a robust product development flow combining algorithms and models, developing a modeling language that supports the definition, analysis and construction of a new system with a 5x speedup, and demonstrating the phase deliverable items can be applied to a notional vehicle system of significant complexity.

Exit criteria for Phase 1a is the successful completion of all of the following subtasks including the deliverables as specified in each subtask.

III.A.1.1 Complexity Metric and Parametric Model

The objective of this task is to develop metrics for evaluating system design complexity, robustness, and corresponding cost/schedule and a formal review of the resulting development with the customer. This task (BAE Systems – lead) is accomplished by identifying a set of causes for schedule delays and developing a set of static and dynamic complexity and adaptability metrics and methods for practically computing each one using the results of simulation, and developing parametric models for accurately estimating cost and schedule of prospective system designs. A majority of this task is performed in the first three months of the phase and culminates in a customer review of the metric and parametric model results. The metric and parametric model continues at a lower level of effort through the rest of the phase, allowing refinements and updates to be made based on other Phase 1a development activities. Task outputs are review presentation materials. Exit criteria for this task are the completion of the Complexity and Adaptability Metrics Review and updated metrics and model inputs to the final report. The following subtasks are defined under this task.

III.A.1.1.1 Metrics and Parametric Model Development and Review

Objective: Contractor **shall** develop, define, and present metrics for evaluating system design complexity and adaptability metrics, and parametric models for computing expected cost and schedule. Contractor **shall** conduct a Complexity Metric and Parametric Model Review with the customer describing the metrics and parametric model design and corresponding results. Contractor **shall** deliver the presentation materials for the customer review.

Approach: Develop a set of causes of schedule delays from analysis of recent vehicle procurements. Informed by this analysis, develop a set of static and dynamic metrics of complexity from a set of categories including: structural

complexity; behavioral complexity; development complexity; emergent complexity; and contention complexity. Develop mechanisms to practically compute each metric using the results of simulation, including qualitative simulation with quantitative justification, design lookahead, and model-based diagnosis. Develop a set of adaptability metrics to measure adaptability to the changes across the full lifecycle, including requirements changes or re-interpretation, design or novel technology surprises or changes, or environmental shocks to the constructed vehicle. Develop mechanisms to practicably compute each metric leveraging qualitative simulation traces and other outputs of the ARRoW design process. Develop summary mechanisms to create aggregate measures of complexity and adaptivity. Refine the metrics to effectively measure complexity and adaptability through experimentation and tuning. Develop parametric models for accurately estimating cost and schedule of prospective system designs based on derived salient characteristics. Develop detailed descriptions of metrics. Conduct a review to present and discuss the metrics, models, and the corresponding rationale.

Responsible Organization: BAE Systems

Planned Duration: 3 months Dependencies: None

Exit Criterion: Completion of the Complexity and Adaptability Metrics Review **Deliverables:** Presentation Materials for Complexity and Adaptability Metrics Review

III.A.1.1.2 Metrics and Parametric Model Updates

Objective: Contractor **shall** refine and update metrics for evaluating system design complexity, robustness, and parametric models for calculating program cost and schedule based on the need for changes identified by other Phase 1a activities. Contractor **shall** include a description of the metrics and parametric model updates in the phase's final report.

Approach: Refine the metrics definition and cost/schedule parametric models based on the outcome of the customer metrics review and evaluations of the metrics conducted iteratively during the phase including the notional demo system application. Update algorithm description documents and prototype implementations consistent with refinements.

Responsible Organization: BAE Systems

Planned Duration: 6 months **Dependencies:** Completion of the Complexity and Adaptability Metrics Review **Exit Criterion:** Completion of updated metrics and model inputs to the Phase 1a Final Report **Deliverables:** None

III.A.1.2 Design, Integration, and Verification Flow

The objective of this task is to design and review the META ARRoW design, integration, and verification work flows. This task (BAE Systems – lead) will develop a robust product development flow including mature algorithms for rapid system definition (including design space exploration), complexity and adaptability evaluation, and probabilistic verification. The bulk of this task is performed within the first five months of the phase and culminates in a customer review of the system design, integration, and verification flow. Flow development continues at a lower level of effort through the rest of the phase, allowing refinements and updates to be made based on other Phase 1a development activities. Task outputs are review presentation materials. Exit criteria for this task are the completion of the Design, Integration, and Verification Review and updated work flow inputs to the final report. The following subtasks are defined under this task.

III.A.1.2.1 Design, Integration and Verification Flow Development

Objective: Contractor **shall** develop a detailed design, integration, and verification flow for development of cyberphysical systems. Contractor **shall** conduct a Design, Integration, and Verification Flow Review with the customer to describe all aspects of the design flow and how it is expected to meet the required reduction in system design time. Contractor **shall** deliver the presentation materials for the Design, Integration, and Verification Flow Review. **Approach:** Design rapid mechanisms to input and modify vehicle designs at multiple levels of abstraction and detail throughout the design maturation lifecycle using industry standards such as SysML and Modelica along with extended input mechanisms for specialized properties needed for ARRoW. Design mechanisms to automatically extend a vehicle's designs to the next level of detail for analysis. Design extensions to the qualitative reasoning with quantitative justification technologies to enable vehicle simulation. Develop extensions to enable qualitative factoring of the design into interacting and non-interacting segments. Design algorithms to analyze annotated traces from the qualitative simulation to compute elements of the metrics designed under a separate task. Extend modelbased diagnosis work to identify targeted elements of the design that may need additional work or that have flaws. Design the presentation of the metrics and diagnosis information to enable effective trading-off of alternatives based on complexity and adaptability metrics. Design the capability to enable tractable whole system design, refinement, simulation, and analysis at all levels of detail without requiring traditional engineering decompositions by designing for efficient algorithms to manage the combinatorics, such as qualitative simulation with quantitative justification. Include algorithms and user-interface design considerations to facilitate this tractable whole system design to enable exploration of large multi-dimensional trade spaces. Design algorithms to compute a probabilistic certificate of correctness, and rapidly recomputed it in the face of adaptation or design changes, from the composition of models in the design, using data from the simulation results and analyses to assess the level to which the entire cyberphysical system will function correctly and to estimate its reliability without requiring real-world testing. Estimate the time compression of system design activities using the defined design, integration and verification flow compared to legacy system development processes. Conduct a customer review of the overall process flow to include representative walkthrough of selected elements of a system design.

Responsible Organization: BAE Systems

Planned Duration: 5 months

Dependencies: None

Exit Criterion: Completion of the Design, Integration and Verification Review

Deliverables: Presentation Materials for Design, Integration and Verification Flow Review

III.A.1.2.2 Design, Integration and Verification Flow Updates

Objective: Contractor **shall** update the META ARRoW design, integration, and verification flow for development of cyber-physical systems. Contractor **shall** report on the results of the work flows updates in the final report.

Approach: Refine the design, integration and verification flow based on outcome of the Design, Integration, and Verification Review and evaluations of the flow conducted iteratively during the phase, including the demonstration of the notional system application. Update the Design Flow Description document and prototype tool implementations to maintain consistency with the design flow and algorithms.

Responsible Organization: BAE Systems

Planned Duration: 4 months Dependencies: Completion of the Design, Integration, and Verification Review Exit Criterion: Completion of updated work flow inputs for the Phase 1a Final Report Deliverables: None

III.A.1.3 Modeling Language Development

The objective of this task is to develop, define, and review a modeling language that supports the definition, analysis, and construction of a new system with 5x speedup. This task (BAE Systems –lead) is accomplished by developing a language definition based on open source modeling languages and available tool definition formats, defining model item characteristics needed at each modeling level, developing a means for maintaining consistency across levels, and defining the repository structure. A majority of this task is performed in the first six months of the phase and culminates in a customer review of the modeling language definition. The modeling language development continues at a lower level of effort through the rest of the phase to refine and update the design based on other Phase 1a development activities. Task outputs are review presentation materials. Exit criteria for this task are the completion of the Modeling Language Review and updated modeling language inputs to the final report. The following subtasks are defined under this task.

III.A.1.3.1 Modeling Language Specification Development and Review

Objective: Contractor **shall** develop the design of a formal modeling language for the system design, integration and verification process. Contractor **shall** conduct a Modeling Language Review with customer to describe the

representation of the defined language including all of its elements. Contractor **shall** deliver presentation materials for the Modeling Language Review.

Approach: Leverage existing open source modeling languages (e.g. SysML, Modelica) and available information interchange format definitions (e.g. DXF) to develop an overall language definition that supports traditional elements of component models important for the new flow, as well as novel characteristics important to enable qualitative simulation, practical computation of the complexity and adaptability metrics, model-based diagnosis, computation of probabilistic certificates of correctness, and other processing needed by the ARRoW system. Develop the capability to combine existing and future specialized modeling languages using standards based transformation languages such as QVT to leverage the significant intellectual investment in existing specialized languages and repositories. Characterize how model uncertainty propagates from component to the system level. Conduct a review of the modeling language for customer.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Completion of the Modeling Language Review Contract Deliverables: Presentation Materials for Modeling Language Review

III.A.1.3.2 Modeling Language Specification Updates

Objective: Contractor **shall** refine and update the modeling language as needed to support the system design, integration and verification flow. Contractor **shall** include an updated description of the defined modeling language as part of the phase final report.

Approach: Refine the modeling language description to support changes in algorithm definitions, updates to the system design, integration and verification flow revisions and overall workflow integration activities.

Responsible Organization: BAE Systems

Planned Duration: 3 months

Dependencies: Completion of the Modeling Language Review

Exit Criterion: Completion of updated modeling language inputs for the Phase 1a Final Report Deliverables: None

III.A.1.4 Notional Demo System Application

The objective of this task is to produce a demonstration of the design and verification processes applied to a notional vehicle demonstration system of substantial complexity. This task, lead by BAE Systems, is accomplished by establishing a software development, integration, and test framework, developing toolset and library component prototypes or partial implementations for the designs developed in the other Phase 1a tasks, and developing a demonstration scenario. In the absence of appropriate tools and component libraries, the demonstration will necessarily be simplified so as to showcase the salient features of the design and verification processes, and resulting system architecture of design flow, metrics and modeling language to the creation of a notional vehicle demonstration system. A majority of this task is performed in the first seven months of the phase and culminates in a customer review of the notional demo system application. The integrated process engineering continues through the rest of the phase to refine and update the system based on review feedback and other Phase 1a development activities. Task outputs are review presentation materials. The exit criteria for this task are the completion of the Notional Demo System Application Review and updated artifact inputs to the final report. The following subtasks are defined under this task.

III.A.1.4.1 Integrated Process Engineering

Objective: Contractor **shall** develop requirements, interface and other design artifacts necessary to define elements of the integrated system development capability. Contractor **shall** develop toolset and library component prototypes, as needed, to explore and test system design, integration, and verification alternatives. Contractor **shall** update the requirements, interface descriptions and other design artifacts during the incremental development of the integrated system development capability.

Approach: Incrementally and iteratively develop system designs, toolset and library component prototypes, and an integrated infrastructure system to support the META ARRoW process. An initial set of requirements specifications, interface definitions, and use cases will be developed along with an initial system architecture (drawing on open standards and advanced integration technologies such as the Run Time Adaptation Framework (RTAF) from DARPA Disruptive Manufacturing Technologies, DMT SWP) and design specification. Existing modeling capabilities will be analyzed for possible re-use and make/buy/reuse decisions for modeling and support tool capabilities will be resolved. The software development, build, and test infrastructure will be established to support developed to test design concepts and alternatives. Example component and manufacturing library models will be developed to facilitate system testing. An initial integration and test plan and procedures will be developed for the notional demonstration system review. A draft user manual and version description document for the system will be made to all work products during each successive spiral.

Responsible Organization: BAE Systems Planned Duration: 7 months Dependencies: None Exit Criteria: Engineering Release Package internal release for use in the Notional Demo System Application Review. Contract Deliverables: None

III.A.1.4.2 Notional Demo System Application Plan and Review

Objective: Contractor **shall** integrate the metric, system design, integration and verification flow and modeling language information into an integrated capability definition. Contractor **shall** conduct a Notional Demo System Application Review to demonstrate that the phase deliverable items can be applied to a notional vehicle demonstration system of significant complexity. Contractor **shall** deliver the Notional Demo System Application Review materials.

Approach: Select a notional vehicle demonstration target that will illuminate the salient features of the design and verification process and system architecture. Employ the Phase 1a deliverable items and existing component models to demonstrate the design, integration, verification and validation of this notional vehicle system. Because the necessary tools and components will not be fully available, the demonstration will consist of a scripted walkthrough as opposed to an integrated end-to-end product demonstration.

Responsible Organization: BAE Systems

Planned Duration: 7 months Dependencies: None Exit Criterion: Completion of Notional Demo System Application Review Deliverables: Presentation Materials for Notional Demo System Application Review

III.A.1.4.3 Integrated Process Engineering Update

Objective: Contractor **shall** analyze results from the notional demonstration system application review along with refinements of the designs being produced in other Phase 1a tasks and refine and update the system requirements, designs, components, tests and development environments. Contractor **shall** include results of post-demonstration analysis as part of final report.

Approach: Analyze feedback and findings from the notional demonstration system application review and identify potential system improvements. Incrementally and iteratively update prototypes and partial system implementations of metrics and parametric models, design, integration, and verification flows, system requirements and designs, toolset and library component prototypes, and the integrated system to address this feedback and refinements in the designs produced in other Phase 1a tasks. Requirements specifications, interface definitions, and use cases will be maintained and updated along with the system architecture and design specification. Software development, build,

and test infrastructure will be maintained to support ongoing development activities. Toolset and library component capabilities will be developed based on set of requirements selected for implementation in each successive spiral. The set of example component and manufacturing library models will be updated and extended to facilitate system testing. Integration and test plan and procedures will be extended and executed for the system. Incremental updates and enhancements will be made to all work products during each successive spiral.

Responsible Organization: BAE Systems

Planned Duration: 2 months

Dependencies: Completion of Phase 1a Notional Demo System Application Review **Exit Criterion:** Updates to the Initial Engineering Release Package and Completion of input to the final report. **Deliverables:** None

III.A.1.5 Program Meetings and Reviews

The objective of this task is to facilitate clear communications between all project performers and stakeholders. This task, under the responsibility of BAE Systems, is accomplished by coordinating and participating in program and project team meetings and providing project status reviews. Task outputs are presentation materials. Exit criteria for this task are the completion of all Phase 1a meetings and reviews, and delivery of associated briefings. The following subtasks are defined under this task.

III.A.1.5.1 Program Meetings

Objective: Contractor **shall** conduct a kick-off meeting to communicate all phase development activities and their interrelationships between all project performers and stakeholders. Contractor **shall** conduct technical interchange meetings to coordinate technical activities among project performers and stakeholders. Contractor **shall** support program-wide Principle Investigator meetings held in concert with all the prime contractors.

Approach: Engage in regular communications between the prime and customer, co-contractors, and subcontractors. Coordination activities will involve a combination of virtual meetings and travel in order to participate in program and project related coordination meetings. Agendas and briefing materials will be generated and presented as needed in order to facilitate communications of ideas. Minutes and action items will be collected. Planned meetings include the Phase 1a Kickoff Meeting, Quarterly Principal Investigator Meetings, and Technical Interchange Meetings. These coordination meetings may be conducted in conjunction with other phase technical reviews and/or conducted virtually at the discretion of the customer PM.

Responsible Organization: BAE Systems Planned Duration: 9 months Dependencies: None Exit Criterion: Completion of all Phase 1a meetings Deliverables: Meeting presentation materials

III.A.1.5.2 Program Reviews

Objective: Contractor **shall** conduct monthly meetings to keep stakeholders informed of project technical and financial status against phase objectives. Contractor **shall** conduct a final phase review to describe overall accomplishments of the phase compared to planned phase objectives.

Approach: Prepare and present status reviews to DARPA PM and other stakeholders. Agendas, review materials, program issues, risks, and review actions will be generated to facilitate communications of project status. Minutes and actions items will be collected. Monthly Progress Reviews will be provided via virtual meetings. These reviews will discuss technical and financial progress against phase objectives, and risk, issue, and review action status since last review. Final Phase Review will be conducted one month prior to the conclusion of Phase 1a and will be at or near the customer site. Final Phase Review will provide a comprehensive review of all Phase 1a accomplishments, and status of all Phase 1a issues, risks, risk mitigations, and actions.

Responsible Organization: BAE Systems **Planned Duration:** 9 months

Dependencies: None

Exit Criterion: Completion of all Phase 1a reviews **Deliverables:** Presentation materials

III.A.1.6 Program Management Planning, Control, and Reports

The objective of this task is to effectively plan and manage the technical and financial activities of the project, and provide stakeholders with accurate and timely technical and financial updates on these activities. This task, under the responsibility of BAE Systems, is accomplished by planning, tracking, and directing the project activities of BAE Systems and all subcontractors, and providing periodic status and financial reports. Task outputs are monthly status reports and a Phase 1a final report. Exit criteria for this task are the completion of all Phase 1a tasks and delivery of all Phase 1a deliverables. The following subtasks are defined for this task.

III.A.1.6.1 Management Planning

Objective: Contractor **shall** develop and maintain a project plan consistent with the contract SOW, and Integrated Master Schedule (IMS). Contractor **shall** set up and maintain a financial tracking system for monitoring and reporting program progress. Contractor **shall** set up a system for managing the configuration of program deliverable and non-deliverable artifacts.

Approach: Develop an overall project plan, financial tracking system, WBS, IMS, project metrics and subcontract/supplier agreements. The overall project plan includes planning for staffing, system development, quality management, configuration management, data management, training, critical resource acquisition, issue and action item management, risk management, metrics tracking, and subcontractor/supplier management. Develop plan updates as needed to address major deviations from the original plans. Insert the program structure within the existing company financial management system to support tracking, monitoring, and reporting of program financial data. Set up a configuration managed repository for capturing and controlling all deliverable and non-deliverable program artifacts. Majority of this task is planned for accomplishment in the first month of the program with updates as needed throughout the phase.

Responsible Organization: BAE Systems

Planned Duration: 9 months Dependencies: None Exit Criterion: Completion of Phase 1a activities Deliverables: None

III.A.1.6.2 Management Control

Objective: Contractor **shall** update program status information in the financial tracking system not less than biweekly. Contractor **shall** update program metrics information not less than monthly. Contractor **shall** prepare and deliver monthly Cost Performance Reports (CPR) reports and quarterly Contract Funds Status Reports (CFSR) financial reports.

Approach: Continuously direct, coordinate, control and approve actions to accomplish overall project objectives within schedule and budget constraints. Control project by maintaining the financial tracking system, configuration/data management system, quality management system, risk register, issue and action logs, and project metrics. Use these systems and techniques to track project technical and programmatic progress; indentify issues, risks, mitigation activities, and actions and track these items to closure; identify and track technical and programmatic metrics; measure the project process quality; track and direct supplier progress; and support the administrative needs of the project. This management activity continues throughout the duration of program phase.

Responsible Organization: BAE Systems Planned Duration: 9 months Dependencies: None Exit Criterion: Delivery of the last Monthly CPR and CFSR Report Deliverables: Monthly CPR and Quarterly CFSR Reports

III.A.1.6.3 Management Reports

Objective: Contractor **shall** compile and deliver a Program Status Report on a monthly basis describing program status. Contractor **shall** develop and deliver a Phase 1a Final Report in the form of: (1) a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal documenting their effort in this phase, (2) a programmatic final report containing financial data and other information not suitable for publication but appropriate for program documentation and planning, and (3) updates to program technical information including updated metrics, parametric models, system design, integration and verification work flows, toolset requirements and modeling language description.

Approach: Create and deliver monthly technical and financial status reports and a Phase 1a final report at the conclusion of Phase 1a. Sources of information feeding into the creation of the reports include labor reporting and financial tracking systems, subcontractor status reports, integrated master schedule status, issues status, risk register status, and the project metrics repository. Phase 1a final report will be a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal (excluding financial data). The final report will document Phase 1a technical and financial efforts, accomplishments, issues, risks and metrics.

Responsible Organization: BAE Systems Planned Duration: 9 months Dependencies: None Exit Criterion: Delivery of Phase 1a Final Report Deliverables: Monthly Technical and Financial Status Reports, Phase 1a Final Report

III.A.2 PHASE 1b

- (1) The objectives of Phase 1b are:
- (2) Complete the design and implementation of all supporting tools
- (3) Develop the detailed requirements for the component and manufacturing model library
- (4) This phase shall be 6 month duration with Milestones (SOW & WBS Level 2):
- (5) Tool Design Review (ATP + 2 months)
- (6) Modeling Language & Library Requirements Review (ATP + 4 months)
- (7) Notional Demo System Application Review (ATP + 5 months)
- (8) Delivery of Toolset (ATP + 6 months)
- (9) Program Meetings and Reviews & Phase 1b Final Review (ATP + 5 months)
- (10) Program Management Planning, Control, and Reports & Phase 1b Final Report (ATP + 6 months)

Approach: Contractor shall design and implement core META ARRoW capabilities (including the component and manufacturing model library detailed requirements and supporting toolsets) and demonstrate system capability using the developed ARRoW components. This Phase will be performed with BAE Systems in the Lead Role and will be supported by PARC, MIT, BBN, and PTC. Phase will be accomplished by designing and implementing supporting tools, developing the modeling language syntax, performing make/buy analyses on model items, identifying and developing components needed for the notional demonstration, demonstrating design and integration, verification, and validation of a defined slice of a representative complexity cyber-physical system, and maintaining and updating system and software documentation products.

Exit criteria for Phase 1b is the successful completion of all of the subtasks below including the deliverables as specified in each subtask and the delivery of the ARRoW toolset.

III.A.2.1 Tool Design

The objective of this task is to design the supporting tools necessary for the practical application of the design, integration, and verification flows developed in Phase 1a. This task, lead by BAE Systems, is accomplished by developing a system architecture and detailed design of each component in the toolset. A majority of this task is performed in the first two months of the phase and culminates in a customer review of the integrated toolset detailed design. The design task continues at a lower level of effort through the rest of the phase to update the design based on other Phase 1b development activities. Task outputs are review presentation materials. The exit criteria for this

task are the completion of the Tool Design Review and updated toolset design inputs to the final report. The following subtasks are defined under this task.

III.A.2.1.1 Tool Designs, Development and Review

Objective: Contractor **shall** develop the detailed design for the integrated system design, verification and validation toolset. Contractor **shall** present the detailed design for the integrated toolset to the customer and identified stakeholders. Contractor **shall** deliver the presentation materials describing the integrated toolset detailed design.

Approach: Develop a detailed design for the integrated system design, verification and validation toolset based on the requirements and system design developed in Phase 1a. This effort includes detailed design of the Design Tools, Test & Verification Tools, Diagnosis Tools, and the Modeling Environment & Repository. The detailed design will be created to be compatible with industry standards and include extension and integration with established tools such as Windchill, ProE and existing modeling and simulation-based engineering tools to create the ARRoW toolset, as well as the ability to plug-in technologies and models as needed over the tool's life using advanced integration technologies such as the Run Time Adaptation Framework (RTAF) from DARPA Disruptive Manufacturing Technologies (DMT SWP). This task culminates in the customer Tool Design Review of the integrated detailed design and subsequent delivery of the review's presentation materials.

Responsible Organization: BAE Systems

Planned Duration: 2 months

Dependencies: Completion of design updates resulting from the Complexity and Adaptability Metrics Review, the Design, Integration and Verification Review, and the Notional Demo System Application Review Exit Criteria: Completion of the Tool Design Review **Deliverables:** Presentation Materials for the Tool Design Review

III.A.2.1.2 Tool Design Updates

Objective: Contractor **shall** update the detailed design for the integrated system design, verification and validation toolset to reflect changes during implementation. Contractor **shall** include an updated description of the toolset design as part of the phase final report.

Approach: Update tool designs as needed throughout Phase 1b.

Responsible Organization: BAE Systems

Planned Duration: 4 months Dependencies: Completion of the Tool Design Review Exit Criteria: Completion of updated Toolset Design for the Phase 1b Final Report Deliverables: None

III.A.2.2 Modeling Language and Library Requirements

The objective of this task is to develop the detailed requirements for the component and manufacturing model library, including the necessary scope and fidelity of the library needed to support the rapid development demo in Phase 2. This task, lead by BAE Systems, is accomplished by defining the syntax for the modeling language designed in Phase 1a drawing on existing open source modeling language or cooperating set of modeling languages tightly integrated using information interchange format definitions, and refining the requirements for the scope, fidelity, and structure of the component and manufacturing model library to be developed in Phase 2. A majority of this task is performed in the first four months of the phase and culminates in a customer review of the modeling language and library requirements. The activity continues at a lower level of effort through the rest of the phase to refine and update the modeling language description and library requirements based on other Phase 1b development activities. Task outputs are review presentation materials. The exit criteria for this task are the completion of the Modeling Language & Library Requirements Review and updated modeling language syntax and modeling library requirements inputs to the final report. The following subtasks are defined under this task.

III.A.2.2.1 Modeling Language and Library Requirements and Review

Objective: Contractor **shall** develop the syntax for the modeling language described in Phase 1a. Contractor **shall** develop the requirements for the model library to be populated in Phase 2. Contractor **shall** conduct a Modeling Language and Library Requirements Review to present the language syntax and component requirements. Contractor **shall** deliver the presentation material for the Modeling Language and Library Requirements Review.

Approach: Derive and define the syntax for the Modeling Language designed in Phase 1a, drawing on existing open source modeling languages (e.g. SysML Modelica) or cooperating set of modeling languages tightly integrated using information interchange format definitions (e.g. DXF). Develop a syntax that re-uses existing modeling language syntax where appropriate and extends the syntax to best capture the range of model item characteristics identified and designed in Phase 1a. Refine the requirements for the scope, fidelity, and structure of the component and manufacturing model library to be developed in Phase 2. Identify existing domain model items that can be adapted for use (as opposed to being constructed) and identify the range of past vehicle models that can be mined to populate the component and manufacturing model libraries in Phase 2. Conduct a Modeling Language and Library Requirements Review presenting the modeling language syntax and requirements for the required structure and content of the model library to be populated in Phase 2. Deliver the presentation material for the Modeling Language and Library Requirements Review.

Responsible Organization: BAE Systems

Planned Duration: 4 months

Dependencies: Completion of design updates resulting from the Modeling Language Review and the Notional Demo System Application Review

Exit Criteria: Completion of Modeling Language & Library Requirements Review

Deliverables: Presentation Materials for Modeling Language & Library Requirements Review

III.A.2.2.2 Modeling Language and Library Requirements Update

Objective: Contractor **shall** update the model language syntax to incorporate changes identified during other Phase 1b development activities. Contractor **shall** update the modeling library requirements to incorporate needed changes identified during other Phase 1b development activities. Contractor **shall** incorporate model language syntax and model library requirement updates as part the Phase 1b Final Report.

Approach: Evaluate need for changes to the modeling language syntax and model library requirements during implementation and demonstration of the integrated system design, integration and verification toolset. Design and integrate changes to the model syntax needed to fully support expected use of the (to be developed) modeling library components by the integrated tool set. Update modeling language syntax description to reflect these necessary changes. Analyze and define changes to the component and manufacturing model library and the components required to fully support use of the integrated toolset for the selected domain. Incorporate the needed changes into the updated model library requirements.

Responsible Organization: BAE Systems

Planned Duration: 2 months Dependencies: Completion of Modeling Language & Library Requirements Review Exit Criterion: Update of modeling language syntax and modeling library requirements for the Phase 1b Final Report Deliverables: None

III.A.2.3 Notional Demo System Application

The objective of this task is to produce a demonstration of the toolset and design and verification processes applied to a notional vehicle demonstration system of substantial complexity. This task, lead by BAE Systems, is accomplished by developing software in multiple spirals to incrementally construct the integrated toolset based on the detailed design established earlier in the phase, and designing a notional vehicle demo system suitable to demonstrate traceability from the notional development process to the program objectives of schedule compression, complexity and cost reduction, and enhanced adaptability. This major task culminates with the Notional Demo System Application Review which demonstrates the use of the toolset for performing a partial system design, integration and verification. The integrated process engineering continues through the rest of the phase to refine and

update the system based on review feedback and other Phase 1b development activities. Task outputs are review presentation materials, and toolset source code and supporting documentation. The exit criteria for this task are the completion of the Notional Demo System Application Review, and updated toolset documentation inputs to the final report. The following subtasks are defined under this task.

III.A.2.3.1 Integrated Process Maintenance

Objective: Contractor **shall** update the metrics and parametric model definitions based on needed changes. Contractor **shall** update system design, integration and verification work flows based on needed changes. Contractor **shall** extend the previous phase demonstration plan to support the integrated toolset demonstration. Contractor **shall** implement and integrate the system design, integration, and verification toolset based on the presented detailed design. Contractor **shall** incorporate updated metric, parametric model, work flows definition and demonstration test plan as part of the Phase 1b final report.

Approach: Perform spiral-based software development to incrementally update foundational metrics and models, requirements, and design; implement identified features; and integrate them into the unified toolset. Incrementally update metrics and parametric models, design, integration, and verification flows, system requirements and designs, toolset and library components, and the integrated system. Requirements specifications, interface definitions, and use cases will be maintained and updated along with the system architecture and design specification. The software development, build, and test infrastructure will be maintained to support ongoing development activities. Toolset and library component capabilities will be developed based on the set of requirements selected for implementation in each successive spiral. The set of example component and manufacturing library models will be updated and extended to facilitate system testing. Integration and test plan and procedures will be extended and executed for the system. Incremental updates and enhancements will be made to all work products during each successive spiral. This task is to be performed in the first five months of the program phase in parallel with other design activities in preparation for the notional demo system application review.

Responsible Organization: BAE Systems

Planned Duration: 5 months
 Dependencies: Completion of Phase 1a Integrated Process Engineering Updates
 Exit Criteria: Engineering Release Package internal release for use in the Notional Demo System Application
 Review
 Deliverables: None

III.A.2.3.2 Notional Demonstration System Application Plan and Review

Objective: Contractor **shall** plan and conduct a Notional Demo System Application Review demonstrating the capability of the integrated toolset to support a partial system design, integration and verification. Contractor **shall** deliver the presentation materials for the Notional Demo System Application Review.

Approach: Select a notional vehicle demonstration target that will demonstrate the ARRoW toolset and is suitable to demonstrate traceability from the notional development process to program objectives of schedule compression, complexity and cost reduction, and enhanced adaptability. Develop mechanisms to measure and enable reporting of that traceability. Core tasks for this activity are defining, preparing, and presenting the demonstration, and recording results.

Responsible Organization: BAE Systems

Planned Duration: 5 Month

Dependencies: Completion of Phase 1a Notional Demo System Application Review and Phase 1a Integrated Process Engineering Updates

Exit Criteria: Completion of Notional Demo System Application Review

Deliverables: Presentation Materials for Notional Demo System Application Review

III.A.2.3.3 Integrated Process Engineering Updates

Objective: Contractor shall analyze the Notional Demo System Application Review feedback and refine and update metrics, parametric models, work flows, system requirements, designs, components, tests and development

environments as needed. Contractor **shall** incorporate required changes into the integrated toolset software and perform tests to ensure correctness. Contractor **shall** integrate the changes identified as part of the Phase 1b Final Report.

Approach: Analyze feedback and findings from the notional demonstration system application review and identify potential system improvements. Update metrics and parametric models, system design, integration, and verification work flows, integrated toolset requirements and designs, toolset and demonstration plan artifacts. Update integrated toolset software consistent with the updated requirements and design and perform necessary regression testing to ensure correct incorporation of intended changes without impact to other functionality. Prepare all updated metric, model, requirements and design artifacts for inclusion in the final report.

Responsible Organization: BAE Systems

Planned Duration: 1 Month
 Dependencies: Completion of Phase 1b Notional Demo System Application Review and Phase 1b Integrated
 Process Maintenance
 Exit Criterion: Completion of updated toolset supporting documentation inputs to final report.
 Deliverables: Toolset source code and supporting documentation

III.A.2.4 Toolset Delivery

The objective of this task is to package and deliver the Toolset with supporting documentation. This task, under the responsibility of BAE Systems, is accomplished by developing both a user manual that describes the general process for using the toolset and how to use each tool within the toolset, and release documentation that describes what is included in the release package, known issues, and system requirements and instructions for installing the toolset. These documents are then included with the packaged software source code and executables. Task outputs are the User Manual, the Version Description Document, and the System Package. The exit criterion for this task is the delivery of the system package. This task is performed partially in parallel with the update of the integrated product development in preparation for the delivery of the software and phase final report. The following subtasks are defined under this task.

III.A.2.4.1 System Documentation

Objective: Contractor shall develop a User's Manual and Version Description Document for the delivered version of the integrated toolset.

Approach: Develop a User's Manual that describes general process for using toolset and how to use each tool within toolset. Develop a Version Description Document that describes what is included in the release package, known issues, and system requirements and instructions for installing toolset.

Responsible Organization: BAE Systems

Planned Duration: 6 months

Dependencies: Completion of Phase 1a Integrated Process Engineering Updates **Exit Criterion:** Completion of User Manual and Version Description Document **Deliverables:** ARRoW User Manual, ARRoW Version Description Document

III.A.2.4.2 System Package and Toolset Delivery

Objective: Contractor **shall** assemble and deliver software comprising the integrated system design, integration, and verification toolset.

Approach: Generate the system package from source code, executables, and support documentation. Verify contents of system package and deliver system package to customer. Preliminary engineering release packages may be generated throughout the phase as needed such as to support system testing and the Notional Demo System Application Review. A final release package including supporting documentation will be generated and delivered at end of the phase.

Responsible Organization: BAE Systems

Planned Duration: 6 months

Dependencies: Completion of Phase 1a Integrated Process Engineering Updates **Exit Criterion:** Delivery of Toolset system package **Deliverables:** Toolset system package with supporting documentation

III.A.2.5 Program Meetings and Reviews

The objective of this task is to facilitate clear communications between all project performers and stakeholders. This task, under the responsibility of BAE Systems, is accomplished by coordinating and participating in program and project team meetings and providing project status reviews. Task outputs are presentation materials. Exit criteria for this task are the completion of all Phase 1b meetings and reviews, and delivery of associated briefings. The following subtasks are defined under this task.

III.A.2.5.1 Program Meetings

Objective: Contractor **shall** conduct a kick-off meeting to communicate all phase development activities and their interrelationships between all project performers and stakeholders. Contractor **shall** conduct technical interchange meetings to coordinate technical activities among project performers and stakeholders. Contractor **shall** support program-wide Principle Investigator meetings held in concert with all the prime contractors.

Approach: Engage in regular communications between the prime and customer, co-contractors, and subcontractors. Coordination activities will involve a combination of virtual meetings and travel in order to participate in programand project-related coordination meetings. Agendas and briefing materials will be generated and presented as needed in order to facilitate communication of ideas. Minutes and action items will be collected. Planned meetings include the Phase 1b Kickoff Meeting, Quarterly Principal Investigator Meetings, and Technical Interchange Meetings. These coordination meetings may be conducted in conjunction with other phase technical reviews and/or conducted virtually at the discretion of the customer PM.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Completion of all Phase 1b meetings Deliverables: Meeting presentation materials

III.A.2.5.2 Program Reviews

Objective: Contractor **shall** conduct monthly meetings to keep stakeholders informed of project technical and financial status against phase objectives. Contractor **shall** conduct a final phase review to describe overall accomplishments of the phase compared to planned phase objectives.

Approach: Prepare and present status reviews to DARPA PM and other stakeholders. Agendas, review materials, program issues, risks, and review actions will be generated to facilitate communication of project status. Minutes and action items will be collected. Monthly Progress Reviews will be provided via virtual meetings. These reviews will discuss technical and financial progress against phase objectives, and risk, issue, and review action status since the last review. Final Phase Review will be conducted just prior to the conclusion of Phase 1b and will be at or near the customer site. Final Phase Review will provide a comprehensive review of all Phase 1b accomplishments, and status of all Phase 1b issues, risks, risk mitigations and actions.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Completion of all Phase 1b reviews Deliverables: Presentation materials

III.A.2.6 Program Management Planning, Control, and Reports

The objective of this task is to effectively plan and manage the technical and financial activities of the project, and provide stakeholders with accurate and timely technical and financial updates on these activities. This task, under

the responsibility of BAE Systems, is accomplished by planning, tracking, and directing the project activities of BAE Systems and all subcontractors, and providing periodic status and financial reports. Task outputs are monthly status reports and a Phase 1b final report. Exit criteria for this task are the completion of all Phase 1b tasks and delivery of all Phase 1b deliverables. The following subtasks are defined for this task.

III.A.2.6.1 Management Planning

Objective: Contractor **shall** update and maintain the project plan consistent with the contract SOW, and IMS. Contractor **shall** update and maintain the financial tracking system for monitoring and reporting program progress. Contractor **shall** update system for managing the configuration of program deliverable and non-deliverable artifacts.

Approach: Update from Phase 1a, the overall project plan, financial tracking system, WBS, IMS, project metrics and subcontract/supplier agreements from the previous phase to support current phase activities. The overall project plan includes applicable updated plans for staffing, system development, quality management, configuration management, data management, training, critical resource acquisition, issue and action item management, risk management, metrics tracking, and subcontractor/supplier management. Develop plan updates as needed to address major deviations from the original plans. Update program structure within the existing company financial management system to support tracking, monitoring, and reporting of program financial data. Update configuration managed repository for capturing and controlling all deliverable and non-deliverable program artifacts. Majority of this task is planned for accomplishment in the first few weeks of the program with updates as needed throughout the phase.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Completion of Phase 1b activities Deliverables: None

III.A.2.6.2 Management Control

Objective: Contractor **shall** update program status information in the financial tracking system not less than biweekly. Contractor **shall** update program metrics information not less than monthly. Contractor **shall** prepare and deliver monthly CPR reports and quarterly CFSR financial reports.

Approach: Continuously direct, coordinate, control and approve actions to accomplish the overall project objectives within schedule and budget constraints. Control project by maintaining financial tracking system, configuration/data management system, quality management system, risk register, issue and action logs; and project metrics. Use these systems and techniques to track project technical and programmatic progress; indentify issues, risks, mitigation activities, and actions and track these items to closure; identify and track technical and programmatic metrics; measure the project process quality; track and direct supplier progress; and support administrative needs of the project. Management activity continues throughout duration of program phase.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Delivery of the last Monthly CPR and CFSR Report Deliverables: Monthly CPR and Quarterly CFSR Reports

III.A.2.6.3 Management Reports

Objective: Contractor **shall** compile and deliver a Program Status Report on a monthly basis describing program status. Contractor **shall** develop and deliver a Phase 1b Final Report in the form of: (1) a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal documenting their effort in this phase, (2) a programmatic final report containing financial data and other information not suitable for publication but appropriate for program documentation and planning, and (3) updates to program technical information including updated metrics, parametric models, system design, integration and verification work flows, toolset requirements and design modeling language syntax and library requirements.

Approach: Create and deliver monthly technical and financial status reports and a Phase 1b final report at the conclusion of Phase 1a. Sources of information feeding into the creation of the reports include labor reporting and financial tracking systems, subcontractor status reports, integrated master schedule status, issues status, risk register status, and the project metrics repository. Phase 1b final report will be of a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal (excluding financial data). Final report will document Phase 1b technical and financial efforts, accomplishments, issues, risks and metrics.

Responsible Organization: BAE Systems Planned Duration: 6 months Dependencies: None Exit Criterion: Delivery of Phase 1b Final Report Deliverables: Monthly Technical and Financial Status Reports, Phase 1b Final Report

III.A.3 PHASE 2

The objectives of Phase 2 are:

- (1) Select and characterize the manufacturing and component library needed to design, integrate, and verify an arbitrary platform in the specified domain
- (2) Develop a detailed model that represents a near-perfect abstraction of each component
- (3) Enable the incorporation of component and manufacturing model uncertainty into the systemlevel verification flow developed in Phase 1

This phase shall be 12 month duration with Milestones (SOW & WBS Level 2):

- (1) Component/Manufacturing Model Library Development Plan Review (ATP + 1 month)
- (2) Notional Demo System Application Review (ATP + 9 months)
- (3) Delivery of Component/Manufacturing Model Library (ATP + 12 months)
- (4) Program Meetings and Reviews & Phase 2 Final Review (ATP + 11 months)
- (5) Program Management Planning, Control, and Reports & Phase 2 Final Report (ATP + 12 months)

Approach: Contractor shall develop the Component/Manufacturing Model Library and integrate the META ARRoW system and demonstrate system capability using the developed ARRoW components. This Phase will be performed with BAE Systems in the Lead Role and will be supported by PARC, MIT, BBN, and PTC and component subcontractors as required. This Phase will be accomplished by identifying and developing the component and manufacturing models required to design a platform in the specified domain, using the developed toolsets, libraries, and integrated models to design, integrate, verify and validate a vehicle, and comparing the effort required and results to that produced by a legacy development process.

Exit criteria for Phase 1b is the successful completion of all of the subtasks below including the deliverables as specified in each subtask and delivery of the Component/Manufacturing Library.

III.A.3.1 Component/Manufacturing Model Library Development Plan

The objective of this task is to develop, present, and maintain a detailed plan to define, obtain and assemble the characterization information needed to populate the component/manufacturing model library. This task, under the responsibility of BAE Systems, is accomplished by planning development activities that align with developing a component/manufacturing model library that supports the demonstration of the ARRoW process and toolset for the selected notional demonstration vehicle. Task outputs are presentation materials and the Component/Manufacturing Model Library Development Plan. This task is to be accomplished primarily in the first month of the phase with updates as needed through the majority of the phase. The exit criteria for this task are the production of the document and support of the review. The following subtasks are defined under this task.

III.A.3.1.1 Component/Manufacturing Library Development Plan Development and Review

Objective: Contractor **shall** develop a plan for the development of the Component/ Manufacturing Model Library. Contractor **shall** present the plan for development of the Component/Manufacturing Library in a Component/Manufacturing Model Library Development Plan Review.

Approach: Assemble a plan for obtaining and integrating the required information for the elements of the component and manufacturing library based on the requirements and providers identified in Phase 1b. Plan identifies all of the suppliers of component and manufacturing library information, what data (e.g. attributes/models) each of them need to provide for library construction and how data uncertainty is to be identified and addressed (e.g., through physics based simulation, testing, etc.). Plan also defines how information is to be provided and incorporated into the overall library. A Component/Manufacturing Model Library Development Review is then held to describe the plan.

Responsible Organization: BAE Systems

Planned Duration: 1 Month

Dependencies: Completion of Phase 1b Modeling Language & Library Requirements Updates **Exit Criteria:** Completion of Component/Mfg Model Library Development Plan Review **Deliverables:** Materials for Component/Mfg Model Library Development Plan Review

III.A.3.1.2 Component/Manufacturing Model Library Development Plan Updates

Objective: Contractor **shall** update the Component/Manufacturing Model Library Development Plan to incorporate needed changes. Contractor **shall** incorporate the updated plan as part of the Phase 2 Final Report.

Approach: Throughout development of the Component/Manufacturing Model Library, the plan for its development will be revisited to determine the need for adjustments. Plan will then be updated based on any necessary changes identified.

Responsible Organization: BAE Systems

Planned Duration: 11 months Dependencies: Completion of Component/Mfg Model Library Development Plan Review Exit Criteria: Completion of Component/Mfg Model Library Development activities Deliverables: None

III.A.3.2 Notional Demo System Application

The objective of this task is to produce a demonstration of the implemented ARRoW toolset and realized component model library (applied to a notional demonstration vehicle of substantial complexity) and refine the toolset. This task, lead by BAE Systems, is accomplished by first choosing a notional vehicle demo target suitable for demonstrating the tools and models as they exist during the period of the task and for enabling traceability from the notional development process to the program objectives of schedule compression, complexity and cost reduction, and enhanced adaptability; refining and developing mechanisms to measure and enable reporting of that traceability; and enhancing the toolset and processes based on continuous library demonstration development feedback. This major task culminates with the Notional Demo System Application Review which demonstrates the use of the toolset for performing a partial system design, integration, and verification. Evaluation of the demo includes the identification of potential system improvements and the maintenance and updating of product documentation. The integrated process engineering continues through the rest of the phase to refine and updates the library, toolset, and other artifacts based on review feedback and other Phase 2 development activities. Task outputs are review presentation materials and updated toolset system package with supporting documentation. The exit criteria for this task are the completion of the Notional Demo System Application Review, delivery of the updated toolset with supporting documentation, and updated toolset documentation inputs to the final report. The following subtasks are defined under this task.

III.A.3.2.1 Integrated Process Maintenance

Objective: Contractor **shall** update the source artifacts for the integrated toolset and model library based on needed changes identified during this phase. Contractor **shall** implement changes to the toolset and model libraries based on the changes identified.

Approach: Incrementally and iteratively update metrics and parametric models, design, integration, and verification flows, system requirements and designs, toolset and library components, and the integrated system. As needed, maintain and update requirements specifications, interface definitions, and use cases along with the system architecture and design specification. Maintain software development, build, and test infrastructure to support ongoing development activities. Update toolset and library component capabilities as needed to support ongoing model library development. Update and execute the integration and test plan and procedures as needed for the system. Update user manual and version description document for the system and generate release packages as needed. Make incremental updates and enhancements to all work products during each successive engineering maintenance spiral.

Responsible Organization: BAE Systems Planned Duration: 9 months Dependencies: Completion of Phase 1b Integrated Process Engineering Updates Exit Criteria: Engineering Release Package internal release for use in the Notional Demo System Application Review Deliverables: None

III.A.3.2.2 Notional Demonstration System Application Plan and Review

Objective: Contractor **shall** develop a detailed plan for conducting a demonstration for a selected vehicle domain. Contractor **shall** perform a system design, integration and verification for the selected domain of vehicles demonstrating traceability from the notional development process to the program objectives for schedule compression, complexity and cost reduction, and enhancements in architectural adaptability. Contractor **shall** perform a Notional Demo System Application Review describing the results of the demonstration activity. Contractor **shall** deliver the presentation materials for the Notional Demo System Application Review.

Approach: This activity uses the developed toolset and populated component libraries to perform the design, integration, verification and validation of a notional demonstration vehicle of substantial complexity from the general domain of systems announced by the customer at the beginning of the phase. Select a notional vehicle demonstration target that will demonstrate the ARRoW toolset, which is feasible with the partially populated component libraries, and is suitable to demonstrate traceability from the notional development process to the program objectives of schedule compression, complexity and cost reduction and enhanced adaptability. Refine and develop mechanisms to measure and enable reporting of that traceability. Core tasks for this activity are defining, preparing, and presenting the demonstration, and recording the results.

Responsible Organization: BAE Systems

Planned Duration: 9 months
 Dependencies: Completion of Phase 1b Notional Demo System Application Review and Phase 1b Integrated
 Process Engineering Updates
 Exit Criteria: Completion of Notional Demo System Application Review
 Deliverables: Presentation Materials for Notional Demo System Application Review

III.A.3.2.3 Integrated Process Engineering Updates

Objective: Contractor **shall** analyze the results from toolset and library development and the Notional Demo System Application Review. Contractor **shall** incorporate updates to the integrated toolset software and associated documentation, as needed, and perform tests to ensure correctness. Contractor **shall** integrate changes identified as part of the Phase 2 Final Report. Contractor **shall** assemble and deliver the software comprising the integrated system design, integration, and verification toolset.

Approach: Analyze feedback and findings from the demonstration system development and Notional Demo System Application Review to identify potential refinements and/or improvements. Incrementally and iteratively update metrics and parametric models, design, integration, and verification flows, system requirements and designs, toolset and library components, and the integrated system. As needed, maintain and update requirements specifications, interface definitions, use cases, and system architecture and design specification. Maintain the software development, build, and test infrastructure to support ongoing development activities. Update, as needed, toolset and library component capabilities based on the set of requirements selected for implementation in each successive spiral, and perform tests of those capabilities to demonstrate tool readiness for Phase 3 and program goals. Update and execute, as needed, the integration and test plan and procedures for the system. Make incremental updates and enhancements to all work products during each successive engineering maintenance spiral. Deliver final version of toolset system package with supporting documentation.

Responsible Organization: BAE Systems

Planned Duration: 3 months

Dependencies: Completion of Phase 2 Notional Demo System Application Review and Phase 2 Integrated Process Maintenance

Exit Criterion: Delivery of final system package with supporting documentation **Deliverables:** Toolset system package with supporting documentation

III.A.3.3 Component/Manufacturing Model Library

The objective of this task is to characterize the elements of the manufacturing and component library needed to design, integrate, and verify an arbitrary platform in the specified domain and incorporate these characteristics into an integrated library so that the following can be accomplished:

- 1. It can be represented in the design process developed in Phase 1, enabling manufacturing and implementation trades in the course of design optimization
- 2. It is applicable across a broad range of disciplines present in typical aerospace and defense systems, including power systems, avionics/instrumentation, data, control systems, software, thermal management systems, structures and structural components, etc.
- 3. It supports development of a detailed model that represents a near-perfect abstraction of each component, including static and dynamic interactions of that component through power, data, and structural interfaces, as well as spurious (generally undesirable) interactions such as thermal, vibrations, and electromagnetic radiation
- 4. It enables the incorporation of component and manufacturing model uncertainty into the systemlevel verification flow.

This activity, lead by BAE Systems with the support of subcontractors and component suppliers, will involve a combination of data gathering, theoretical modeling, and actual characterization of components in a laboratory or real-world environment through measurements of thermal source characteristics, electromagnetic radiation properties, etc. Component and manufacturing suppliers will be identified and collaborated with to execute this phase of the program. Task outputs are model libraries. Exit criteria for this task are the delivery of the Component/Manufacturing Model Library package with supporting documentation. The following subtasks are defined under this task.

III.A.3.3.1 Instantiated Component Models

Objective: Contractor **shall** populate the model library with component information compatible with the integrated system design, integration and verification toolset.

Approach: Execute Component/Manufacturing Model Library Development Plan to populate model library with required information on identified component. Perform data mining on existing product line and developmental system data to extract characteristics and model information from components, subsystems, and systems for integration into the component model library. Integrate information provided by external suppliers on out-sourced items. Perform engineering activities required to transform and augment legacy and acquired models and data to meet META ARRoW data, form, function, and interface specifications of the Component Model Library. Perform quality checks at appropriate functional and abstraction levels to ensure consistency of representation and compliance with modeling language syntax and semantics. Information on the source (i.e. pedigree), scope and evaluation of each model library component will be developed and compiled into a full report on the library content.

Responsible Organization: BAE Systems **Planned Duration:** 12 months

Dependencies: Completion of Component/Manufacturing Model Library Development Plan **Exit Criteria:** Component Model Library populated **Deliverables:** None

III.A.3.3.2 Instantiated Manufacturing Models

Objective: Contractor shall populate the model library with manufacturing information compatible with the integrated system design, integration and verification toolset.

Approach: Execute the Component/Manufacturing Model Library Development Plan to populate the model library with required information on identified manufacturing information. Perform data mining on existing product line and developmental system data to extract characteristics and model information on manufacturing of components, subsystems, and systems for integration into the model library. Perform engineering activities required to transform and augment legacy and acquired models and data to meet META ARRoW data, form, function, and interface specifications of the Manufacturing Model Library. Perform quality checks at appropriate functional and abstraction levels to ensure consistency of representation and compliance with modeling language syntax and semantics. Information on the source (i.e. pedigree), scope and evaluation of each model library manufacturing entity will be developed and compiled into a full report on the library content.

Responsible Organization: BAE Systems Planned Duration: 12 months Dependencies: Completion of Component/Manufacturing Model Library Development Plan Exit Criteria: Manufacturing Model Library populated Deliverables: None

III.A.3.3.3 Component/Manufacturing Model Library Delivery

Objective: Contractor **shall** deliver the Component/Manufacturing Model Library. Contractor **shall** deliver documentation describing the contents of the Component/Manufacturing Model Library.

Approach: Package Component/Manufacturing component library for delivery. Develop final versions and deliver detailed documentation including usage information and content, architecture, and interface descriptions. Preliminary engineering release packages may be generated throughout the phase as needed such as to support system testing and the Notional Demo System Application Review. A final release package including supporting documentation will be generated and delivered at the end of the phase.

Responsible Organization: BAE Systems

 Planned Duration: 12 months

 Dependencies: Completion of Phase 1b Integrated Process Engineering Updates

 Exit Criteria: Delivery of Component/Manufacturing Model Library package

 Deliverables: Component/Mfg Model Library package with supporting documentation

III.A.3.4 Program Meetings and Reviews

The objective of this task is to facilitate clear communications between all project performers and stakeholders. This task, under the responsibility of BAE Systems, is accomplished by coordinating and participating in program and project team meetings and providing project status reviews. Task outputs are briefing materials. The exit criteria for this task are the completion of all Phase 2 meetings and reviews, and delivery of associated briefings. The following subtasks are defined under this task.

III.A.3.4.1 Program Meetings

Objective: Contractor **shall** conduct a kick-off meeting to communicate all phase development activities and their interrelationships between all project performers and stakeholders. Contractor **shall** conduct technical interchange meetings to coordinate technical activities among project performers and stakeholders. Contractor **shall** support Principle Investigator meetings.

Approach: Engage in regular communications between the prime and customer, co-contractors, and subcontractors. Coordination activities will involve a combination of virtual meetings and travel in order to participate in program and project related coordination meetings. Agendas and briefing materials will be generated and presented as needed in order to facilitate communications of ideas. At the conclusion of the meetings, minutes and actions will be collected. Planned meetings include the Phase 2 Kickoff Meeting, Quarterly Principal Investigator Meetings, and Technical Interchange Meetings. These coordination meetings may be conducted in conjunction with other phase technical reviews and/or conducted virtually at the discretion of the customer PM.

Responsible Organization: BAE Systems

Planned Duration: 12 months

Dependencies: None

Exit Criterion: Completion of all Phase 2 meetings and closure or agreed to closure plans for all interim meeting actions

Deliverables: Meeting presentation materials, minutes, and action item logs

III.A.3.4.2 Program Reviews

Objective: Contractor **shall** conduct monthly meetings to keep stakeholders informed of project technical and financial status against phase objectives. Contractor **shall** conduct a final phase review to describe overall accomplishments of the phase compared to planned phase objectives.

Approach: Prepare and present status reviews to stakeholders. Agendas, review materials, program issues, risks, and review actions will be generated to facilitate communications of project status to key project stakeholders. Minutes and action items will be collected. Monthly Progress Reviews will be provided via virtual meetings. These reviews will discuss technical and financial progress against phase objectives, and risk, issue, and review action status since the last review. The Final Phase Review will be conducted one month prior to the conclusion of Phase 2 and will be at or near the customer site. The Final Phase Review will provide a comprehensive review of all Phase 2 accomplishments; the status of all Phase 2 issues, risks, risk mitigations and actions; and document the development of detailed manufacturing and component libraries.

Responsible Organization: BAE Systems Planned Duration: 12 months Dependencies: None Exit Criterion: Completion of all Phase 2 reviews Deliverables: Presentation materials

III.A.3.5 Program Management Planning, Control, and Reports

The objective of this task is to effectively plan and manage the technical and financial activities of the project, and provide stakeholders with accurate and timely technical and financial updates on these activities. This task, under the responsibility of BAE Systems, is accomplished by planning, tracking, and directing the project activities of BAE Systems and all subcontractors, and providing periodic status and financial reports. Task outputs are weekly cost and status reports and a Phase 2 final report. Exit criteria for this task and each subtask are the completion of all Phase 2 tasks and delivery of all Phase 2 deliverables. The following subtasks are defined under this task.

III.A.3.5.1 Management Planning

Objective: Contractor **shall** update and maintain the project plan consistent with the contract SOW and IMS. Contractor **shall** update and maintain the financial tracking system for monitoring and reporting program progress. Contractor **shall** update system for managing the configuration of program deliverable and non-deliverable artifacts.

Approach: Update from Phase 1b, the overall project plan, WBS, SOW, IMS, project metrics and subcontract/supplier agreements. Develop informal, non-auditable earned value management system. The overall project plan will include planning for staffing, system development, quality management, configuration management, data management, training, critical resource acquisition, issue and action item management, risk management, metrics tracking, and subcontractor/supplier management. Develop plan updates as needed to address major deviations from the original plans. Update the program structure within the existing company financial

management system to support tracking, monitoring, and reporting of program financial data. Update the configuration managed repository for capturing and controlling all deliverable and non-deliverable program artifacts. The majority of this task is planned for accomplishment in the first few weeks of the program with updates as needed throughout the phase.

Responsible Organization: BAE Systems Planned Duration: 12 months Dependencies: None Exit Criterion: Completion of Phase 2 activities Deliverables: None

III.A.3.5.2 Management Control

Objective: Contractor **shall** update program status information in the financial tracking system not less than weekly. Contractor **shall** provide update reports on non-auditable cost and earned value (at WBS Level 3) on a weekly basis with not more than one week latency. Contractor **shall** update program metrics information not less than monthly. Contractor **shall** prepare and deliver monthly CPR reports and quarterly CFSR financial reports.

Approach: Continuously direct, coordinate, control and approve actions to accomplish the overall project objectives within schedule and budget constraints. Control project by maintaining the financial tracking system, configuration/data management system, quality management system, risk register, issue and action logs, and project metrics. Use these systems and techniques to track project technical and programmatic progress; identify issues, risks, mitigation activities, and actions and track these items to closure; identify and track technical and programmatic metrics; measure the project process quality; track and direct supplier progress; and support the administrative needs of the project.

Responsible Organization: BAE Systems Planned Duration: 12 months Dependencies: None Exit Criterion: Completion of all Phase 2 activities Deliverables: None

III.A.3.5.3 Management Reports

Objective: Contractor **shall** compile and deliver a Program Status Report on a monthly basis describing program status. Contractor **shall** develop and deliver a Phase 2 Final Report in the form of: (1) a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal documenting their effort in this phase, (2) a programmatic final report containing financial data and other information not suitable for publication but appropriate for program documentation and planning, and (3) updates to program technical information including updated metrics, parametric models, system design, integration and verification work flows, toolset requirements and design modeling language syntax and library requirements.

Approach: Create and deliver weekly technical and financial status reports and a Phase 2 final report at the conclusion of Phase 2. Sources of information feeding into the creation of the reports include cost and earn value tracking systems, subcontractor status reports, integrated master schedule status, risk register status, and the project metrics repository. The Phase 2 final report will be a technical manuscript of publishable quality and suitable for publication in a peer-reviewed journal (excluding financial data). The final report will document Phase 2 technical and financial efforts, accomplishments, issues, risks and metrics.

Responsible Organization: BAE Systems Planned Duration: 12 months Dependencies: None Exit Criterion: Delivery of Phase 2 Final Report Deliverables: Weekly Cost and earned Value Reports, Phase 2 Final Report

Report/Deliverable Schedule Below is the report/deliverable schedule for META Program, Phase 1a:

Report/Deliverable	Months after Contract Award
Phase 1a	
1. Phase 1a Kickoff Meeting Presentation Material	As Required
2. Program-Wide PI Meeting Presentation Material	As Required
3. Complexity and Adaptability Metrics Review Presentation Material	3 months
4. Design, Integration and Verification Flow Review Presentation Material	5 months
5. Modeling Language Review Presentation Material	6 months
6. Notional Demo System Application Review Presentation Material	7 months
7. Phase 1a Final Review Presentation Material	8 months
8. Phase 1a Final Report according to Section C-2(a)(2) of the Contract	9 months
9. Monthly Progress Reviews Presentation Material (9 Reviews)	Middle of Each Month
10. Monthly Technical and Financial Status Reports (9 Reports) according to Section C-	Middle of Each
2(a)(1) of the Contract	Month
Phase 1b	
1. Phase 1b Kickoff Meeting Presentation Material	As Required
2. Program-Wide PI Meeting Presentation Material	As Required
3. Tool Design Review Presentation Material	2 months
4. Modeling Language & Library Requirements Review Presentation Material	4 months
5. Notional Demo System Application Review Presentation Material	5 months
6. Phase 1b Final Review Presentation Material	5 months
7. Toolset Delivery	6 months
8. Phase 1b Final Report according to Section C-2(a)(2) of the Contract	6 months
9. Monthly Progress Reviews Presentation Material (6 Reviews)	Middle of Each Month
10. Monthly Technical and Financial Status Reports (6 Reports) according to Section C-	Middle of Each
2(a)(1) of the Contract	Month
Phase 2	
1. Phase 2 Kickoff Meeting Presentation Material	As Required
2. Program-Wide PI Meeting Presentation Material	As Required
3. Component/ Manufacturing Model Library Development Plan Review Presentation Material	1 months
4. Notional Demo System Application Review Presentation Material	9 months
5. Phase 2 Final Review Presentation Material	11 months
6. Component/ Manufacturing Model Library Delivery	12 months
7. Phase 2 Final Report according to Section C-2(a)(2) of the Contract	12 months
8. Monthly Progress Reviews Presentation Material (12 Reviews)	Middle of Each Month
9. Weekly Technical and Financial Status Reports (51 Reports) according to Section C- 2(a)(1) of the Contract	Each Week (one week latency)

HR0011-10-C-0108 Attachment No. 2



DEFENSE ADVANCED RESEARCH PROJECTS AGENCY 3701 NORTH FAIRFAX DRIVE ARLINGTON, VA 22203-1714

April 7, 2010

MEMORANDUM FOR CONTRACTING OFFICER'S REPRESENTATIVE

FROM: DARPA, Contracts Management Office

- TO: Mitch Wolff, AFRL/RZPE, 1950 Fifth Street, Building 18 RZPE, WPAFB, OH 45433-7251; Email: James.Wolff2@wpafb.af.mil
- SUBJECT: Appointment as Contracting Officer's Representative (COR)
- 1. You are hereby appointed as the Contracting Officer's Representative for:

Contract Number:	HR0011-10-C-0108
Contractor:	BAE Systems
Program Description:	META Program

- 2. This appointment authorizes and designates you to perform the following duties and/or responsibilities as specified herein:
 - a. Furnish plans, schedules, specifications, descriptions, and other documents to the contractor as required by the contract.
 - b. Assist the contractor in interpreting technical aspects of the contract specifications/statement of work. Differences of opinion and interpretations which could affect the terms and conditions of the contract will be referred to the contracting officer for resolution.
 - c. Provide Government recommendations/approvals to the contractor promptly in all cases where the contract calls for technical approval.
 - d. Observe, monitor, and assess the contractor's performance under the terms of the contract. This includes reporting promptly to the contracting officer any failures, delays, or significant deviations of performance, quality, costs, or other actions which might jeopardize contract performance.

- 3. In the performance of the duties delegated to you in this letter, you are cautioned that you could be held personally liable for actions taken or directions given by you to the contractor that are beyond the authorities given to you in this letter. The duties or authorities in this letter are not delegable; therefore, you must advise the Contracting Officer or the Contract Administrator/Specialist immediately when you are unable to perform these duties.
- 4. In your dealings with the contractor you must not give technical direction as though the contractor's employees are Government employees. You must maintain a formal, armslength relationship with the contractor in order to avoid even an appearance that the contract is one for personal services. If the contractor's performance takes place in a Government facility, then to the maximum extent practicable, the contractor's work area should be physically separated from areas in which Government employees work, and communication with the contractor's employees on contractual matters should be only through that contractor employee(s) designated by the contractor to supervise them. You must not give any direction to the contractor that is not authorized by the statement of work because it is not the intent of the Government that a contractor be required to do anything that is not included in the contract.
- 5. You are responsible for providing prompt notification to the contracting officer any significant deficiencies with respect to contractor performance or other actions which might jeopardize contract performance.
- 6. You are not authorized by this letter to take any action, either directly or indirectly, that could result in a change in the pricing, quantity, quality, place of performance, delivery schedule or any other terms and conditions of the basic contract, or to direct the accomplishment of effort which would exceed the scope of the basic contract. You must be especially cautious in providing interpretation of the specifications/ statement of work. The agreement reached or technical direction given must be formalized in writing with copies to the contracting officer. You shall also inform the contractor that if he believes that the COR's interpretation is erroneous, the contractor must notify the contracting officer in writing concerning the details of his position.
- 7. Specific duties in addition to those above are as follows:
 - a. Control all government technical interfaces with the contractor.
 - b. Ensure that copies of government technical correspondence are forwarded to the contracting officer for placement in the contract file.
 - c. Promptly furnish documentation on any requests for change, deviation, or waiver (whether generated by the Government or the contractor) to the contracting officer for appropriate action.
 - d. Review and, if required (i.e., Fixed Price Payments), accept invoices submitted through WAWF as stipulated in Section G of the Contract.

- e. Provide required review of Patent/Invention Disclosures made in I-Edison (http://www.iedison.gov).
- f. The COR must maintain a separate file for each contract for which he/she acts as COR. The file should serve as a repository and record of all documents and communications between the contractor and the COR. At a minimum, the file must include a copy of the contract and all modifications as well as the COR appointment letter. Examples of other file documentation may include:
 - Reports required per the contract, e.g. interim and final technical or patent reports
 - Memoranda for Record documenting important contract discussions
 - Records of formal meetings, e.g. post award conference, program reviews, etc.
- g. Assist ACO and/or PCO, as requested, with closeout activities at completion of contract period of performance.
- 8. If this is your first appointment as a COR or if you have not performed COR duties within the last two years, and in order to comply with DFARS 201.6-2, you must complete COR training immediately so that you can properly execute your responsibilities under this contract. A good source of COR training is available via a web-based module, CLC 106, "Contracting Officer Representative with a Mission Focus" at www.dau.mil.
- 9. Your appointment as COR for this effort expires upon final disposition of the contract.
- 10. Your good judgment in performing your duties under the contract will have an important effect on the value of the performance obtained by the Government.

7/10

Christopher L. Glista Contracting Officer

Contracting Officer's Representative

4/7/10

Date



DEFENSE ADVANCED RESEARCH PROJECTS AGENCY 3701 NORTH FAIRFAX DRIVE ARLINGTON, VA 22203-1714

BAE Systems Land & Armaments ATTN: 4800 East River Road Minneapolis, MN 55421

Reference:

(a) Contract No. HR0011-10-C-0108

(b) BAE Systems Land and Armaments' Proposal entitled, "Proposal Response for DARPA META BAA," dated February 18, 2010

Subject: ADVANCE AGREEMENT TO AUTHORIZE INCURRENCE OF PRE-AWARD COSTS

The Contracts Management Office (CMO), Defense Advanced Research Projects Agency (DARPA) has received a valid and properly funded procurement request, ARPA Order No. Z666/00, in support of performance of the referenced proposal. DARPA anticipates to execute a new contract for the META program as described in said proposal.

Since the Contracting Officer has determined that incurrence of costs before the actual execution of a contract is necessary to ensure compliance with the delivery schedule, the Government and BAE Systems Land and Armaments ("Contractor") hereby agree as follows:

FIRST: In the event that a contract is awarded, pre-award costs, <u>not to exceed \$300,000</u> shall be allowable under the contract, provided that the individual cost elements therein shall be:

- (1) Otherwise allowable, reasonable and allocable;
- (2) Incurred <u>no sooner than the signature date of the Contracting Officer indicated in this</u> Advance Agreement or after July 1, 2010; and
- (3) Incurred specifically and exclusively to accomplish work for Phase 1a of the META program according to Sections III.A.1.5 and III.A.1.6 of the referenced technical proposal.

SECOND: Contract terms and conditions shall be agreed to by the earlier of:

- (1) July 1, 2010 or;
- (2) the date on which the amount of funds obligated, committed or expended under this Advance Agreement is equal to no more than \$300,000.

THIRD AND FINALLY: It is the intention of the Government to award a contract to the Contractor subject to final agreement on the contract terms and conditions, specifications and price(s), which contract shall incorporate this Advance Agreement. It is understood and agreed by the parties herein that this Agreement concerns the treatment of pre-award costs in the event of a contract. This Agreement does not require the Contractor to incur any such costs, and any

costs so incurred are strictly at the risk of the contractor, until such time that a contract may be awarded.

FOR THE CONTRACTOR:

FOR THE UNITED STATES OF AMERICA DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

(b)(6)

Christopher L. Glista Contracting Officer

Name and Title

(b)(6)

13/2010 Date

5/17/10

Date

HR0011-10-C-0108, Page 2 of 2

			1. CONTRACT I	1. CONTRACT ID CODE	
AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT					
2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT	NO.(Ifapplicable)
P00001	22-Jul-2010	SEE SCHEDULE			
6. ISSUED BY CODE	HR0011	7. ADMINISTERED BY (Ifother than item 6)	COL	DE S240	IA
DARPA		DCMA TWIN CITIES B.H. WHIPPLE FEDERAL BLDG			
		ROOM 1150			
3701 N. FAIRFAX DR.		FT. SNELLING MN 55111			
ARLINGTON VA 22203					
8. NAME AND ADDRESS OF CONTRACTOR	(No., Street, County,	State and Zip Code)	9A. AMENDME	ENT OF SOI	LICITATION NO.
BAE SYSTEMS LAND & ARMAMENTS, LP.					
MINNEAPOLIS MN 55421-1402			9B. DATED (SE	EE ITEM 11	.)
			104 MOD OF	CONTRAC	T/ORDER NO
			X HR0011-10-C-0108		
			10B. DATED (SEE ITEM 13)		
CODE 44114	FACILITY COL	DE	X 14-Jul-2010		
11.	THIS ITEM ONLY A	APPLIES TO AMENDMENTS OF SOLI	CITATIONS		
The above numbered solicitation is amended as set forth	n in Item 14. The hour and	date specified for receipt of Offer	is extended,	is not exter	ided.
Offer must acknowledge receipt of this amendment prio	or to the hour and date spec	cified in the solicitation or as amended by one oft	he following methods:		
(a) By completing Items 8 and 15, and returning	copies of the amendmen	nt; (b) By acknowledging receipt of this amendme	nt on each copy of the off	er submitted;	
or (c) By separate letter or telegram which includes a re	ference to the solicitation	and amendment numbers. FAILURE OF YOUR A	CKNOWLEDGMENT	IO BE	
REFECTION OF YOUR OFFEN THEY ACTION OF YOUR OFFEN THEY	ie RECEIPTOFOFFERS	PRIOR TO THE HOUR AND DATE SPECIFIEI	J MAY KESULTIN	ter	
provided each telegram or letter makes reference to the	solicitation and this amend	dment, and is received prior to the opening hour a	nd date specified.	ter,	
12 ACCOUNTING AND APPROPRIATION DA	ATA (If required)		-		
See Schedule	(
13. THIS ITE	MAPPLIES ONLY	TO MODIFICATIONS OF CONTRACT	VORDERS		
IT MODI	FIES THE CONTRAC	CT/ORDER NO. AS DESCRIBED IN ITH	EM 14.		
A. THIS CHANGE ORDER IS ISSUED PURSU	JANT TO: (Specify a	authority) THE CHANGES SET FORTH	IN ITEM 14 ARE M	IADE IN TI	Æ
CONTRACT ORDER NO. IN ITEM 10A.					
B THE ABOVE NUMBERED CONTRACT/C	RDER IS MODIFIED	TO REFLECT THE ADMINISTRATIV	VE CHANGES (such a	as changes in	naving
office, appropriation date, etc.) SET FORT	H IN ITEM 14, PUR	SUANT TO THE AUTHORITY OF FA	R 43.103(B).	is enunges n	r puy mg
C. THIS SUPPLEMENT AL AGREEMENT IS	ENTERED INTO PU	URSUANT TO AUTHORITY OF:			
X D. OT HER (Specify type of modification and Section H-15, Section H-16, and FAR 217-7	authority)				
E IMPORTANT: Contractor X is not	is required to sig	m this document and return	conies to the issuing	office	
	is required to sig		copies to the issuing	g office.	
14. DESCRIPTION OF AMENDMENT/MODIFI	CATION (Organized	by UCF section headings, including solic	itation/contract subje	ect matter	
Modification Control Number: jyeung1090	08				
(See Pages 2 and 3)					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or	print)	16A. NAME AND TITLE OF CO	NTRACTING OFFIC	ER (Type of	or print)
CHKIS GLISTA/ TEL: 674.218.4405			EMAIL christopher		vil.
15B CONTRACTOR/OFFEROR	15C DATE SIGNE	D 16B UNITED STATES OF AME		160	DATE SIGNED
135. CONTRACTOROFFEROR	150. DATE SIGNE	10b. UNITED STATES OF AMEL		100	, DATE SIGNED
BY 22-Jul-2010			2-Jul-2010		
(Signature of person authorized to sign)		(Signature of Contracting Of	ficer)		
EXCEPTION TO SF 30 APPROVED BY OIRM 11-84		30-105-04	ST A Pres	NDARD FC	DRM 30 (Rev. 10-83) SA

TOTAL

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

The purpose of the modification is to exercise Option 1, CLIN 0002, Phase 1b of the META Program at the costplus-fixed-fee amount originally negotiated at \$9,461,917.00; thus increasing the total amount of the Contract by the same amount of \$9,461,917.00 from \$3,693,699.00 to \$13,155,616.00. As a result of the option exercise, the modification extends the term of the Contract by six (6) months from April 13, 2011 to October 13, 2011; and provides an increment of funds of \$7,956,301.00 to partially fund Option 1. Accordingly, make the following changes:

SECTION A - SOLICITATION/CONTRACT FORM

• The Total Amount of the Contract is increased by \$9,461,917.00 from \$3,693,699.00 to \$13,155,616.00.

SECTION B - SUPPLIES OR SERVICES AND PRICES

• CLIN 0002 (Phase 1b) is exercised as follows:

CONTRACT LINE ITEM NO. (CLIN) 0002 OPTION	<u>SUPPLIES/SERVICES</u> Option 1 - META Program, Phase 1b	ESTIMATED COST	FIXED FEE	<u>ESTIMATED</u> <u>COST PLUS</u> <u>FIXED FEE</u> \$9,461,917.00
OF HON	The Contractor shall perform the META Program, Phase 1b in accordance with Section III.A.2 of Attachment No. 1 - Statement of Work and Section C-1 of the Contract. Technical data, reports, and other deliverables are not separately.			
	priced and shall be provided to the Government in accordance with Sections C-2, F-2, F-3, and Attachment No. 1 of			

• SubCLIN 000201 is added as follows:

CONTRACT LINE

ITEM NO. (CLIN)	SUPPLIES/SERVICES
000201	Funding for CLIN 0002, Option 1
	AO No. Z666/00/01
	ACRN AA: \$7,956,301.00

the Contract.

SECTION F - DELIVERIES OR PERFORMANCE

- At Section F-1 <u>Term of Contract</u>, paragraph (b):
 - <u>Delete</u>: (b) In the event that the Government elects to exercise Option 1, the period of performance for the option, as set forth in CLIN 0002, shall commence from the effective date of the option exercise through six (6) months thereafter.
 - <u>Replace with:</u> (b) The term of Option 1, CLIN 0002, commences on April 14, 2011 and continues through October 13, 2011.

SECTION G - CONTRACT ADMINISTRATION DATA

Accounting and Appropriation

Summary for the Payment Office

• As a result of this modification, the total funded amount of the Contract is increased by \$7,956,301.00 from \$3,693,699.00 to \$11,650,000.00.

SubCLIN 000201:	<u>ACRN</u> AA	9700400 1320 Z666 P0M30 2525 DPAC 0 5408 S12136 62303E
		is increased by \$7,956,301.00 from \$0 to \$7,956,301.00
		(AO Nos. Z666/00 and Z666/01)

• At Section G-6 - Incremental Funding, paragraph (a):

Delete: (a) The Contract is fully funded.

<u>Replace with</u>: (a) This Contract shall be subject to incremental funding with \$11,650,000.00 presently made available for performance under the Contract. It is estimated that the funds presently available are sufficient to permit the Contractor's performance through September 13, 2011. Except in accordance with the Section I clause FAR 52.232-22, "Limitation of Funds," no legal liability of the part of the Government for payment of any money in excess of \$11,650,000.00 shall arise unless and until additional funds are made available by the Contracting Officer through a modification to this contract.

SECTION I - CONTRACT CLAUSES

Delete:	FAR 52.232-20	Limitation Of Cost	APR 1984
Replace with:	FAR 52.232-22	Limitation Of Funds	APR 1984

 $\sim~End~\sim$