

Task Order Plan (TOP)

Contract Number: NNM05AB50C

TO Title: Vehicle System Design and Integration Tool Development

TO Number: 32-090103 **Revision:** 03

Period of Performance: 10/02/2010 to 9/30/2011

MSFC Initiator: Chad Summers

(b)(4)

Emergency: YES

Subelement – 01 (WBS 432938.11.01.08.40)

Subelement – 02 (WBS 432938.11.01.08.40)

Subelement – TA (WBS 599489.02.07.08.14.02)

Revision 03: The purpose of this revision is to add subelement TA as described below. Sections 1.0, 2.0, 3.0, 9.0 and the Performance Plan were revised to capture the additional subelement. Additionally, the (b)(4) The previous revision was estimated at (b)(4) This revision is estimated at (b)(4) s an increase of (b)(4).

- **Subelement – TA (599489.02.07.08.14.02)**

- Added subelement TA due to an increase in scope identified by the customer to provide system design and integration support for the Nano Energetic Propulsion Project (NEPP).

Increase in Labor Hours: (b)(4)

Total Increase in Estimate: (b)(4)

Revision 02: The purpose of this revision is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 2, 2010 through September 30, 2011. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance.

Revision 01: The purpose of this revision is to add subelement 02 as described below. Additionally, Section 1.0, Section 2.0, Section 3.0, Section 5.0, Section 6.0, and Schedule were revised. The (b)(4) (b)(4) The previous revision was estimated at (b)(4) This revision is estimated at (b)(4) which is an increase of (b)(4)

- **Subelement – 02 (432938.11.01.08.40)**

- Added subelement 02 due to an increase in scope identified by the customer to support the development of Decision Analysis Process and Tools. This includes both direct labor and subcontractor support for work to be performed in September 2010. Due to subcontractor invoicing cycles, the subcontract estimate for work performed in September

2010 (b)(4) will be estimated in October of the Contract Year 6 / Fiscal Year 2011 task order revision.

Total Increase in Labor Hours: (b)(4)

Total Increase in Subcontractor Estimate: (b)(4)

Total Increase in Estimate: (b)(4)

1.0 Task Order Description & Objectives

Subelement 01 - Vehicle System Design and Integration Tool Development

1. Provide engineering support for the development and maturation of design and integration tools for vehicle and spacecraft conceptual design, analysis, and development planning.
Tools will be developed for: Vehicle systems and subsystem layout and sizing
 - a. Conceptual Analysis
 - b. Mass properties estimation
 - c. Design parameter sensitivity
 - d. Development cost estimation
 - e. Critical path schedule assessmentThe work shall include graphical user interface development for the tool set as well as specific engineering discipline based module maturation and project based module maturation.
2. Provide expertise necessary to a) establish tool requirements, b) develop concepts, c) implement software solutions necessary for spiral development of the branch tool set and d) ensure continuous development of the tool through maturing both analytical processing capabilities and the model fidelity.
3. Provide support for Vehicle/Subsystem System Requirements Performance Validation, System Design Concepts, and Preliminary Functional Design.
4. Provide the following necessary data for decision makers in order to meet critical engineering and/or project level milestones. This will include but not limited to:
 - a. Cost estimates
 - b. Schedule assessments
 - c. Technical data (Vehicle Systems/Subsystems design parameters)

Subelement 02 – Decision Analysis Process and Tool Development

1. Provide technical support for the development of a decision analysis process and tool that aids in the consistent and efficient execution of architecture trade studies at multiple levels, including system, element, and sub-system that is applicable to a variety of MSFC-supported projects.
2. Provide expertise necessary to support decision analysis process definition, develop tool requirements, and implement software solutions necessary for incremental development of the tool to establish an initial capability.

Subelement TA – NEPP System Design and Integration Support

1. Perform vehicle performance analysis for selected missions using Vehicle System Design Capability (VSDC) tool.
2. Perform system engineering functions on NEPP including requirements definition, system design, trade studies, and system engineering integration.

3. Conduct special topics system analysis and trade studies, including enhancing VSDC tool code to address special study needs.

2.0 Technical Approach (Including required input, guidelines & assumptions)

Subelement 01 - Vehicle System Design and Integration Tool Development

1. Communicate and integrate with subject matter experts (SMEs) in developing tool requirements.
2. Evaluate commercial off-the-shelf (COTS) solutions as well as software development applications/techniques for tool development. Identify and recommend mitigation and execute activities to resolve open issues or reduce tool development risk.
3. Implement a phase/spiral development approach to implement the software tool.
4. Develop a historical vehicle/subsystem design database library of concepts Support the generation of issue/risk burn down plans, development of task schedules and identification and communication of resource requirements.
5. Work may involve the coordination and integration with other external elements and projects as well as internal product teams and engineering disciplines.
6. Assist in reporting efforts and developing and delivering effective presentations such as monthly and other reviews.

Subelement 02 - Decision Analysis Process and Tool Development

1. Identify, recommend, and implement NASA and industry best practices in the tool and related processes and procedures.
2. Support will include the review and application of appropriate processes and, procedures such as the Analytic Hierarchy Process (AHP), Simple, Multi-Attribute Ranking Technique (SMART), value functions, and Multi-Attribute Utility (MAU) analysis to meet capability objectives.
3. Develop task schedules and resource estimates.
4. Support generation of a tool capability development pathway that provides new and/or expanded capabilities using an evolutionary approach.
5. Work/Assist in reporting efforts and developing and delivering effective presentations.

Subelement TA - NEPP System Design and Integration Support

1. Use the Vehicle System Design Capability (VSDC) tool to perform system analysis functions and trade studies.
2. Communicate with subject matter experts (SMEs) in addressing system design options and trade space.
3. Develop task schedules and resource estimates.

4. Support generation of a tool capability development pathway that provides new and/or expanded capabilities to meet Nano Energetic Propulsion Project (NEPP) program needs.
5. Assist in reporting efforts and developing and delivering effective presentations.

3.0 Discussion of Skills Required

Subelement 01 - Vehicle System Design and Integration Tool Development

Task personnel shall be a mix of engineers with backgrounds in various discipline specialties and experience supporting space systems development in all life-cycle phases. Primary focus should be based on experience with Pre-phase A and Phase A conceptual design and analysis. The experience within the task personnel will include: software programming utilizing in C, C++, Java, or Fortran with graphical user interface (GUI), structural/vehicle sizing, systems engineering (integrated analysis and development of vehicle systems/subsystems), commercial off-the-shelf (COTS) computer aided design (CAD) package, such as SolidWorks, and the ability to develop mass estimating relationship (MER) based on analytical equations and/or historical database.

Subelement 02 - Decision Analysis Process and Tool Development

Task personnel shall possess experience and proficiency in application of decision analysis tools and techniques such as AHP, SMART, value functions, MAU analysis, and stakeholder surveys are required. Programming skills in Visual Basic for Applications (VBA) to control MS Excel using macros is required. Background in architectural trades is strongly preferred.

Subelement TA - NEPP System Design and Integration Support

Task personnel shall possess experience and proficiency in use of the Vehicle System Design Capability (VSDC) tool. Programming skills in Visual Basic for Applications (VBA) to control MS Excel using macros is required. Background in architectural trades is strongly preferred.

4.0 Special Tools Required

None.

5.0 Participating Subcontractors

(b)(4)

6.0 Milestones & Deliverables

Monthly Activity Reports

VSDC code development plan (November, 2010)

- a) Requirements development phase
- b) Concept development phase
- c) Software development phase (Spiral 1, 2, and 3)
- d) Recommendation phase(s) for forward application
- e) Prototype release

Initial VSDC code (prototype) release (November, 2010)

Decision Analysis Methodology & Process Summary (December, 2010)

- a) Summarizes the decision analysis methodology and processes selected for application in the decision analysis capability based on existing NASA and industry policies, practices, and experience.

Decision Analysis Tool Development Path (January, 2011)

- a) Provides definition of the initial capabilities of the decision analysis tool and a recommended evolutionary path for development and enhancement of capabilities.

Decision Analysis Final Report (February, 2011)

- a) Provides final inputs to the first two deliverables and recommendations for establishing a comprehensive Decision Support Framework.

7.0 Special Considerations (Recruiting, Special Equipment / Material, Safety, etc.)

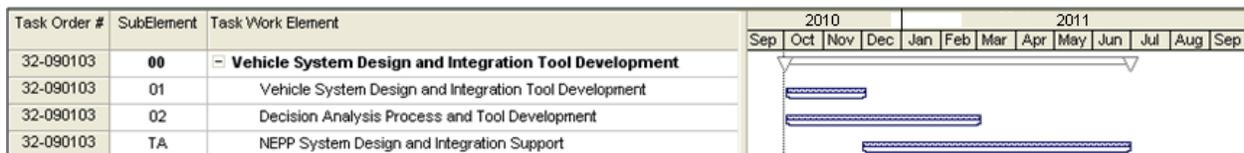
None.

8.0 Work Shelf

The following activities could be accomplished as part of the Task Order performance by personnel that are temporarily available due to program or funding delays on other Tasks. Specific assignments will be coordinated with the Task Initiator to ensure appropriate skills and experience.

TO/Subelement	Description	Due Date	Skill
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9.0 Schedule



ESTS Contract Task Order Request Performance Plan

Task Order Title: [Vehicle System Design and Integration Tool Development](#)

Task Order Number: [32-090103](#) Revision: 03

Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X 65% = Justification
Perform tool development and program support for vehicle systems design and integration to allow for concept development, design, analysis, evaluation, and selection as well as initial cost and schedule assessments based on concept selection and technology readiness and/or risks.		
Schedule Objectives (Milestones)	Weighting Schedule % 10% (min 10%)	Schedule Score X 10% = Justification
All products including plans, documents, databooks, schedules, or other are delivered at the designated milestones except as negotiated by NASA and Jacobs.		
Cost (actual vs. negotiated)	Weighting Cost% 25% (min.25%)	Cost Score X 25% = Justification
	Weighting Total % 100.00%	Total Score

Technical, Schedule, and Cost Grading Scale

Score	Description
9.0-10.0	Exceeded TO Performance Plan objectives resulting in major benefit(s)
8.0-8.9	Exceeded TO Performance Plan objectives resulting in modest benefit(s)
7.0-7.9	Met TO Performance Plan objectives
3.0-6.9	Did not meet all TO Performance Plan objectives resulting in minimal impact or requiring additional agency funds
0.0-2.9	Did not meet TO Performance Plan objectives resulting in substantial impact and/or requiring additional agency funds

ESTS Contract Task Order Request Performance Plan

Task Order Number: [Vehicle System Design and Integration Tool Development](#)

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Comments:

Risk Assessment

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Task Order Risk Assessment to Cost, Technical, and Schedule

List identified risk associated with Task Order performance as related to task cost, technical, and schedule. Classify the risk(s) according to probability of occurrence and impact as defined below and enter the risk into risk matrix.

Risk	Risk Type	Probability (1-4)	Impact (1-4)	Risk Description
Risk C1	Cost			No cost risks have been identified for this Task Order.
Risk C2	Cost			
Risk T1	Technical	2	4	Technical goals not achievable without utilizing existing engineering capabilities/technologies.
Risk T2	Technical			
Risk S1	Schedule	3	3	Milestone deliverables not met due to near timeframe.
Risk S2	Schedule			

*Note: See page 2 for risk mitigation plan for those risks which are Primary Risk Drivers.

