Attachment 01

Beyond 3D (B3D) Requirements - TREX

Background and Objectives:

The National Geospatial-Intelligence Agency (NGA) Foundation for GEOINT 3D (FG3D) has struggled to identify a technology that is an acceptable mix of both expediency and accuracy when it comes to RAPID 3D. The NGA has been participating in the United States Special Operations Command (USSOCOM) RAPID 3D IPT calls and demonstrations and is seeking to further the RAPID 3D prototype project through further development that will include key capabilities allowing for broad adoption and application. NGA agrees with the USSOCOM's assessment that the time associated with development, integration, and user feedback have the potential to make the end product not relevant before it can be implemented at the operational level. NGA desires to evolve the traditional acquisition cycle and take the RAPID 3D technology and develop it to NGA Unique specifications and quickly provide a prototype that will prove the concept and be deployed operationally for an extended "real world" test and evaluation period. It is NGA's desire to award this agreement in a way that would allow the capability to be transitioned into a program of record (POR).

The Beyond 3D effort will continue to advance the SOCOM RAPID 3D work to NGA holdings within the NGA cloud system architecture to include scalability as well as additional APIs and/or SDKs to allow for seamless integration within the DoD and IC communities. Scalability to provide a geospatial big data architecture that supports both command and control (C2), and modeling and simulation (M&S) users requires the ability to serve up geo-specific real-world content, in a rapid fashion to the user communities. The desired system will transform and conflate source from multiple sensors into an environment that supports machine to machine automation to accelerate processing, exploitation, and dissemination and the generation of OGC CDB compliant databases. The environment will be capable of integrating applications, data, systems and services planned to be transitioned to modern commercial technologies and streaming updated information to tactical users in real time without degradation of services. For new capabilities and tools, the same objectives noted in the RAPID 3D prototypes applies to include new solutions development for low TRLs, in a rapid fashion, to achieve a TRL 8 over the next 24 months.

Delivered solutions will include the addressing of several capability gaps to include API/SDK development, metric tools, automated workflow pipelines and integration of NGA holdings as part of the 3D content production and access for and to others within the NGA specific cloud networks. The Beyond 3D project itself will be an unclassified effort. However, the NGA will have the responsibility to integrate these capabilities across unclassified, secret, and top-secret networks in order to meet the DoD and IC M&S community needs. The vendors will need to consider this in its solution as it pertains to Information Assurance (IA). These objectives include extension of SOCOM RAPID 3D efforts as well as new feature extraction tools, new metric tools to include quality, pipeline processing and versioning control, user profile needs integration and an OGC pilot for NGA's Office of Geomatics for standards based interoperability as well as serving the "best" content based upon a user's AOI choice(s). For all software delivered for these objectives, the developer will provide all code, test and accreditation documentation, software build instructions and source code required to meet DoD System Requirements Specifications for accredited software.

For the Automation algorithms, the developer will need to consider the following:

- Develop M&S automation algorithms, APIs, and/or SDKs for 3D integration mission needs for unclassified, secret and JWICS environments
- Deliver the algorithms in a rapid iterative fashion with phasing to support government priorities for test and evaluation, user assessment, interoperability experimentation, and initial deployment.
- Translation APIs/SDKs for conflation and GEOINT 3D formats shall have minimal third-party dependencies, simple UI, and execute with the least amount of user interaction possible.
- Users must have the ability to interface with a 2D map to draw a bounding box or rubber band style delineation of their area of operation and select the desired mission output at the desired Level of Detail
- Translation APIs/SDKs with NGA's FG3D cloud architecture, web UI, USSOCOM's Geospatial Services, Joint Staff's Terrain Generation Service and other Government UI's.

This project is directly relevant to enhancing the mission effectiveness of special operations forces personnel and will enhance several areas that are currently key technology gaps. These include process automation, source agnostic 3D content generation, rapid generation, and available to the SOF community in a format (size) that is usable for disadvantaged operators at the tactical edge.

Scope/High Level Overview:

NGA desires advanced technology for further development and application to the NGA community at large for their unique specifications. The Beyond 3D prototype project will use the latest version of the USSOCOM RAPID 3D prototype in order to further advance the prototype for the NGA user community. The Beyond 3D prototype project will continue to advance the SOCOM Rapid 3D work to NGA holdings within the NGA cloud system architecture to include scalability as well as additional APIs and/or SDKs to allow for seamless integration within the DoD and IC communities. Scalability to provide a geospatial big data architecture that supports both command and control (C2), and modeling and simulation (M&S) users requires the ability to serve up geo-specific real-world content, in a rapid fashion to the user communities. The desired system will transform and conflate source from multiple sensors into an environment that supports machine to machine automation to accelerate processing, exploitation, and dissemination and the generation of OGC CDB compliant databases. The environment will be capable of integrating applications, data, systems and services planned to be transitioned to modern commercial technologies and streaming updated information to tactical users in real time without degradation of services. For new capabilities and tools, the same objectives noted in the Rapid 3D prototypes applies to include new solutions development for low TRLs, in an Agile fashion, to achieve an overall TRL 8 for all capabilities over the next 24 months.

Delivered solutions will be modular and open in nature and will include the addressing of several capability gaps to include API/SDK development, metric tools, automated workflow pipelines and integration of NGA holdings as part of the 3D content production and access for and to others within the NGA specific cloud networks. The NGA anticipates that their internal staff and the development team(s) will be responsible for integrating the Beyond 3D capabilities into the classified environments. These objectives include extension of SOCOM Rapid 3D efforts as well as new and existing feature extraction tools, new and existing metric tools to include quality control, pipeline processing and versioning control, user profile needs integration and an OGC pilot for NGA's Office of Geomatics for standards-based interoperability as well as serving the "best" content based upon a user's AOI choice(s). For all software delivered for these objectives, the developer will provide all code, test and accreditation documentation, software build instructions and source code required to meet DoD/NGA System Requirements Specifications for accredited software.

This project is directly relevant to enhancing the mission effectiveness of special operations forces personnel and will enhance several areas that are currently key technology gaps. These include process automation, source agnostic 3D content generation, rapid generation, and available to the DoD and IC communities in a format (size) that is usable for disadvantaged operators at the tactical edge.

Delivered solutions will be part of the Beyond 3D prototype project composed of five (5) objectives: NGA's Cloud Based Environment, Geo-registration and co-registration, Rapid 3D enhancements & automation, Tool expansion, and Metrics are each considered a solution.

Deliverables (hardware, software, reports, etc.) will be determined during final Statement of Work collaborations with selected offerors, prior to award.

Technical Objectives of the Program

The objectives for the Beyond 3D effort, which are noted below, continue forward with the USSOCOM's Rapid 3D efforts within the NGA designated environments. All objectives can be developed on the unclassified networks and will be deployed across all other Government owned networks. It is envisioned that these objectives will be developed, tested and integrated in an agile nature with demonstration of meeting the objectives at the end of each sprint cycle and prior to deployment within the NGA cloud based, open architecture framework.

OBJECTIVE ONE: NGA's CLOUD BASED ENVIRONMENT

Enhanced processing using NGA's cloud environments will provide a more optimal way to process correlated 3D scene visualization and content products to reduce production time and optimize deployment. The desired systems would reduce cloud-based transactions and file count for imagery and production of 3D content; reduced I/O transfer to clients; speed on-demand creation of imagery tiles or selected using cloud-based methodologies, accelerated methods; and maintain compliance with Open Geospatial Consortium (OGC) specifications including OGC CDB in order to support legacy systems.

OBJECTIVE TWO: GEO-REGISTRATION & CO-REGISTRATION

Geo-registration will develop a means to centrally manage enormous amounts of 3D geospatial data. The desired system will co-register disparate and multiple data sources including imagery (both satellite and aerial), full motion video (FMV), photos, point clouds, vectors, rasters and user-generated correlated content for modeling and simulation products. The system must be able to correlate and conflate data at the most accurate coordinates possible with trade-offs for simplicity, accuracy, confidence level, metadata/provenance and error estimation.

OBJECTIVE THREE: RAPID 3D ENHANCEMENTS & AUTOMATION

The purpose of this objective is to enhance and extend the existing SOCOM RAPID 3D prototypes for the NGA user community. These objectives include scalability to provide a geospatial big data architecture that supports both command and control (C2) and modeling and simulation (M&S) within an open-architecture, cloud-based environment. The desired system will transform source content from multiple sensors, existing content, metadata/provenance and updated content into and from an environment that supports machine-to-machine automation to accelerate processing, exploitation, and dissemination. This content will support modeling and simulation formats from NGA holdings to the user requested supported formats such as 3D tiles, game engines, etc., which is also compliant with CDB and NGA/OGC standards. The open architecture environment will be capable of integrating applications, data, systems and services using modern commercial technologies. User requests for modeling and simulation content requested from NGA will allow for updates to tactical users in real time without degradation of services.

OBJECTIVE 4: TOOL EXPANSION

Objective 4 focuses on the tools which will need to be developed to support additional imagery sources for 3D content production, automated metadata tools, metrics assessments for by products for derived 3D modeling and simulation processes and processing, data fusion, data conflation, incorporation of existing NGA research toolsets, and SDK's/API's for users to be able to visualize, disseminate, construct, and access NGA's 3D modeling and simulation and ODS holdings. These tools will be implemented seamlessly into the existing NGA 3D modular and open architecture workflow processing pipeline for 3D modeling and simulation to include co-production of such content.

OBJECTIVE 5: METRICS

The purpose of this objective is metrics assessment tools for by products from derived 3D modeling and simulation automated workflow processes and processing to include source data, feature extraction, shopping of NGA source data and subsequent 2D and 3D modeling and simulation products resulting from such processing. Metrics assessment tools will be used to update the end-to-end processing pipelines and workflows for the "best of" breed feature extraction and other types of algorithms utilized to produce the modeling and simulation content.