



Sandia National Laboratories



U.S. DEPARTMENT OF
ENERGY

Project Accomplishment Summary

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.



Sandia National Laboratories

Operated for the U.S. Department of Energy by
Sandia Corporation
Albuquerque, New Mexico

PROJECT ACCOMPLISHMENTS SUMMARY

Cooperative Research and Development Agreement (#1812.01.00)

between **Sandia National Labs** and Northrop Grumman Systems Corporation

Note: This Project Accomplishments Summary will serve to meet the requirements for a final abstract and final report as specified in Article XI of the CRADA.

Title: Remote Sensing System (Engineering Change Proposal (ECP)

Final Abstract:

The purpose/objective of this project was for Sandia National Laboratories (Sandia) to collaborate on understanding and improving the performance of a Remote Sensing System (RSS), culminating in a System Requirements Review (SRR) owned/led by Northrop Grumman Aerospace Systems (NGAS). Sandia has domain expertise in Remote Sensing System design and technology which will be used by NGAS in the development of space and defense systems. This effort benefits all involved, including the public/taxpayers, by ensuring that legacy knowledge and associated risk reduction is not lost to future developments.

Background:

Sandia National Laboratories has domain expertise in Remote Sensing System design and technology. This project was initiated by NGAS to further their understanding of RSS system architectures, CONOPs, requirements, I&T, subsystem options, and risk reduction associated with related supporting technologies. Sandia's domain expertise is complemented by system engineering expertise at NGAS.

Description:

The primary technical objective was to provide technical expertise to inform an SRR (System Requirements Review) owned/led by Northrop Grumman Aerospace Systems (NGAS). More specifically, tasks and deliverables involved Sandia supporting the following task areas as defined in PTS 1: (1) Collection segment architecture/CONOPs, (2) Requirements development and validation, (3) I&T planning, (4) Supplier RFI and RFP review and assessments, (5) FPA risk reduction activities update, (6) Fiber Optic Transceiver requirements development update, and (7) technology transfer support for working group meetings and SRR preparations.

In general, objectives and deliverables were met in all areas:

- (1) Arch/CONOPs: SNL participated in and provided products for a broad range of system architecture trades and CONOPs development activities; Line-of-sight modeling and analysis, radiometric performance and calibration, path delay and BER analysis, RGW kickoff and draft requirements, and CONOPs for system test, SOH monitoring, operational configurations, and throughput. SNL generated 6 reference architectures to validate subsystem allocations for mass and power. In addition, SNL hosted a "factory visit" with NGAS team and provided detailed briefings on RSS domain-specific topics.
- (2) R&V: SNL provided detailed review of all NGAS-generated requirements products, supporting weekly working group meetings as the effort matured. Critical activities included performance as a function of aperture size, stray light analysis, as-built versus as-specified evaluations, MTF impact analysis, and focus control trade analysis. SNL also supported requirements gap analyses which

identified potentially missing system level requirements. SNL identified this as a risk to be addressed on PTS-2.

- (3) I&T: SNL participated in working group activities for payload I&T planning; provided lessons learned briefs, test flows, and test documentation.
- (4) Supplier engagement: SNL supported multiple supplier Q&A telecons, led by NGAS; addressed MTF specifications and analysis, thermal data, power and limited life component models, and jitter measurements. Tech transfer inputs, contractor lists and drawing counts, were also provided to NGAS to support their independent source selection activities.
- (5) FPA Risk Reduction: SNL collaborated with NGAS on several products: FPA modes definition, lessons learned, FPA requirements sensitivity analyses, FPA test options, and SRR action item responses. Other activities involved testing and corroborating FPA output discontinuities on in house ROICs and the provision of the following tech transfer products: FPA radiation testing/results, spare FPA summary, FPA characterization lab capabilities report and component level FPA test plans.
- (6) Fiber Optic Transceiver Trade: SNL collaborated with NGAS on final trade summary charts for fiber optic transceiver versus copper; ultimately, copper was selected by NGAS as baseline.
- (7) Tech Transfer: SNL supported working group meetings with both system and payload teams, culminating in SRR. Direct SRR inputs involved an as-built versus as-specified performance assessment and a payload I&T lessons learned summary. Per thread inputs were provided assessing for each requirement category; lessons learned, requirement changes, verification changes, and identification of issues/risks. Tech transfer products included RvsC summaries and TPM comparisons.

All project artifacts were compiled and uploaded to a collaborative shared site. Monthly status report and financial reports for the project were included.

This project under ran by 12% as a result of negotiated descoping of tasks 4, 5, and 6 with broader scope in Task 1 than originally planned.

Benefits to the Department of Energy:

The information exchanged under this CRADA will benefit Sandia sensor program work, part of which is executed for NA-22, and is related to Sandia's core nuclear weapon mission. The system engineering processes that will be exercised and refined for this activity can be applied to a broad range of core Sandia programs.

Economic Impact:

There are anticipated benefits and economic gains for both industry and the taxpayer as a result of the collaboration under this CRADA. Sandia's transfer of legacy expertise and knowledge to NGAS will save the nation reinvention costs, reduce risks and will ensure the application of lessons learned.

Project Status:

Completed

ADDITIONAL INFORMATION

Laboratory/Department of Energy Facility Point of Contact for Information on Project

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Company Size and Points of Contact

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CRADA Intellectual Property

None

Technology Commercialization

None

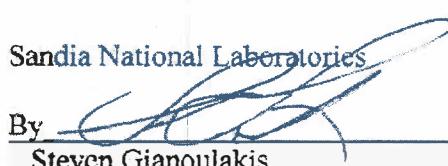
Project Examples

All deliverables are classified.

PROJECT ACCOMPLISHMENTS SUMMARY
Cooperative Research and Development Agreement (SC13/01812.01.00)
between Sandia National Laboratories and Northrop Grumman Systems
Corporation

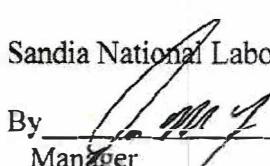
This summary has been approved for public release by Sandia and Northrop Grumman Systems Corporation

Sandia National Laboratories

By 
Steven Gianoulakis
Principal Investigator

1/6/15
Date

Sandia National Laboratories

By 
Manager
WFO/CRADA Agreements

11-26-14
Date

Northrop Grumman Systems Corporation

By _____
Title:

Date

In order to expedite the process, if we do not receive your signed reply by 02/11/2015
we will assume your concurrence for the release of this document to the public.