National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Comprehensive Large Array-data Storage System (CLASS)
006-48-01-13-01-3205-00-108-023
Operational Analysis
FY 2007

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Executive Summary

The Comprehensive Large Array-data Storage System **(**CLASS) project supports the effort to understand climate variability and change to enhance society's ability to plan and respond through the application of modern, proven techniques and technology. By engineering a transition to an enterprise-capable data storage solution, CLASS will provide efficient management of high volumes (petabytes) of data critical to the United States Global Change Research Program and the scientific community. Management of the large volume of environmental data requires a rapid expansion in storage capacity at the Data Centers and automation of data ingest, archive, quality control, and access functionality. Significant increases in data volumes over the next 15 years and corresponding growth in the number and sophistication of system users necessitate this shift from the traditional archive paradigm to a fully operational and integrated system managed at the enterprise level. For example, data from the $4.5 billion NPP and NPOESS programs will utilize CLASS in lieu of building standalone, dedicated data archival systems.

Large portions of the Nation's current archive of environmental data are stored and maintained by the NOAA National Data Centers. These data exist in disparate systems, with non-standard archive and access capabilities. CLASS will provide a standard, integrated solution to data archive and access, resulting in numerous benefits: an easy-to-use access portal for the Nation to obtain environmental data; integration of data for the user (Search, Browse, Geospatial capabilities); higher quality and volume of environmental data which contributes to improvements in prediction capabilities; and decreased cost of redundant resources. To realize these benefits, the CLASS program has identified technologies and best practices to efficiently archive the vast quantities of NOAA satellite and in situ observational data; to safely and permanently preserve those valuable data for future generations to use; and to provide rapid data access in a cost-effective manner. In March 2008 CLASS will award a ten year contract to build the CLASS system. As more systems use CLASS for their archiving, CLASS will receive funding from their new users.

The CLASS Operational Analysis (OA) supports the operational components located in Suitland, MD and Asheville, NC. These operations primarily support data from the Geostationary Operational Environmental Satellites (GOES), Polar-orbiting Operational Environmental Satellites (POES) Ground Systems, and the Defense Meteorological Satellite Program (DMSP). This OA is an annual, in-depth review of the program’s performance based on the following:

- Customer Results
- Strategic and Business Results
- Financial Performance
- Innovation

This report focuses on the operational state of the program as of September 30, 2007, and is based on guidance developed by the Department of Commerce. The CLASS program directly facilitates the NOAA Strategic Goal to “Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond” and DOC Goal 3.1 “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs”. The current program meets established cost, schedule and performance parameters.

1.0 Customer Results

The CLASS program is fully meeting the customer's needs and the program is delivering the services that it is intended to deliver as outlined in the NOAA and NESDIS operational plans. CLASS archives and provides access to data used by the NOAA National Data Centers (NNDCs) as well as an extensive user community. These data are used to support a broad range of products that impact nearly every economic sector of the nation. In addition, CLASS is instrumental in preserving long-term data records of environmental conditions. The nation is a stakeholder; other customers include federal agencies including National Aeronautics and Space Administration (NASA), state and local governments, academic researchers, individuals, first responders, and corporations in the agribusiness, lumber, utilities, transportation, travel, real estate development, and health industries.

The impact of these data and products are documented in the Economic Statistics for NOAA. This document is available from the following website:
http://www.economics.noaa.gov/library/documents/economic_statistics_and_methodology/NOAAEconomicStatistics-May2006.pdf

1.1 Customer Requirements and Costs

The CLASS program is fully meeting the customers' current needs and requirements and is delivering the data and services as outlined in the NOAA and NESDIS operational plans. The value of CLASS data archiving has been well documented and mandates a continued need for this investment. The cost to the customer is as low as it could be for the results delivered.

1.2 Performance Measures

CLASS mission is two fold: storage archival of valuable climate data, and data distribution to a large user community to support immediate needs for environmental data and to facilitate scientific research. CLASS performance measures address both components of the CLASS mission:

- The number of files cataloged is the indicator of the number of files that are being preserved by CLASS and that are readily available to the user community, and
- The number of files delivered is the indicator of CLASS data usage by the user community.

Both performance measures are important and complementary. CLASS must strive to continue enhancing its data availability and at the same time continue its outreach and interface enhancement activities to make the data easily accessible by a wider user community.

These measures align with the "Customer Results Measurement Area" of the Performance Reference Model developed by the Federal Enterprise Architecture Program Management Office (FEA-PMO). Table 1 summarizes the customer performance measure.

Table 1: Customer Results Performance Measure

Measurement Area	Indicator	FY2007 Baseline	FY2007 Actual Result	Comments
Customer Results	Increase volume of environmental data files delivered to customers	Target for FY07 was data delivery of 5.83M files	10.2M data files delivered as of 6/30/07	Achieved 175% increase over target by the third quarter of FY07

2.0 Strategic and Business Results

The CLASS program is meeting its own goals and objectives as well as those of the agency. Program management and controls are in place to ensure the program continues to meet its goals and objectives and monitor how well the CLASS program performs.

2.1 CLASS Helps to Achieve Strategic Goals

In line with the current NOAA Strategic Plan for FY2006-FY2011, the CLASS program directly supports the mission goal to "Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond." Today there are significant demands on virtually all of NOAA's programs to provide information to the Nation and the World community on the health of the environment in real-time. The CLASS website provides worldwide continuous availability of NOAA environmental data.

2.2 Business Results

2.2.1 Program Management and Controls

The CLASS program is guided by the Office of Management and Budget (OMB), DOC, and NOAA guidelines and policies. Oversight is provided by NESDIS, including the NESDIS Information Technology Resource Management (ITRM) team and the NESDIS Chief Information Officer (CIO). A baseline of annual activity is contained in the matrix Annual Operating Plan (AOP) which is approved by the line office.

CLASS performs extensive, continuous operational analysis of the performance of the CLASS system's operational components. This ensures that the system resources and the ancillary supporting infrastructure (security, training, facilities, etc.) as well as labor resources remain optimally functional and configured to support NOAA NESDIS goals.

CLASS conducts an objective measurement of resource and performance metrics of the CLASS elements. For all IT components, performance thresholds have been established and performance is measured continuously through mainly automated process, supplemented by a manual process when required. Performance data are gathered at the functional level and reported on a weekly basis. CLASS management reports to Ground System management on a monthly basis. In addition, CLASS reports to NESDIS management as requested. Performance deficiencies in the CLASS operational system resulting from hardware are referred to the maintenance contractor for remediation.

Performance deficiencies for IT systems resulting from software problems are also handled by the maintenance contractor. Key performance issues and risks are identified through these reviews and tracked by CLASS management.

The CLASS operational environment includes a large IT component. Therefore, CLASS managers must keep abreast of changes in technology that would impact operations. They identify risks to current operations and identify viable alternatives for improving CLASS systems and processes. The results of this analysis are the basis for CLASS input to the Ground System Five Year Plan as well as the CLASS Ten Year Plan.

2.2.2 Monitoring Cost, Schedule and Performance

Cost – CLASS conducts a variety of budget analyses throughout the fiscal year. Obligations and expenditures are tracked on a weekly basis. Labor costs and full time equivalent usage are tracked on a bi-weekly basis. Earned Value Management (EVM) of cost and schedule variances are analyzed monthly and reported to OSD Management. A needs analysis is conducted annually in conjunction with the Planning, Programming, Budgeting and Execution System (PPBES) and the Ground System Division's budget planning processes. Key budget issues and risks are identified through these reviews and tracked by CLASS management.

Schedule – Weekly CLASS Project Management Team (CPMT) meetings allow the project manager to track progress towards key milestones and other operational aspects of the program (e.g., IT security compliance, data availability, etc.).

Performance – Contract performance is monitored to support both budget and performance measurements. CLASS operations are conducted utilizing contractors. For these contracts, CLASS management receives monthly status reports and meets at least quarterly with contract management to review performance, priorities, lessons learned, and work plan. A more formal review is held at the end of each contract year to assess the performance, come to agreement on ways to maximize CLASS efficiency and productivity, and to decide on potential corrective actions and milestones. Hardware maintenance contracts are reviewed on a semi-annual basis for technology advances impacting system maintainability, reliability, and interoperability.

The CLASS monthly project report, which summarizes CLASS cost, schedule, and performance, provides the Ground System Division management with information for monitoring the CLASS program.

2.3 Reviews

As part of the NOAA program management structure, the CLASS program is reviewed continuously throughout the year. Each data center and program manager is responsible for monitoring their individual monthly spending and reporting to the NESDIS Headquarters Financial Officer any unacceptable deviations, along with explanations and a corrections plan.

The CLASS project underwent a programmatic review at NOAA and DOC as part of its acquisition activities.

2.4 Security

The CLASS system is accredited under requirements in NOAA 212-13(08/06/90) and NESDIS Information Technology Security Policy that are based on OMB and NIST guidance. System Security Plans, Risk Assessments, and Contingency Plans were certified and approved for CLASS. The CLASS system has been through the C&A Process and has been granted Full Authority to Operate. CLASS C&A was completed in September 2005. The CLASS contingency plan was tested in May 2007. Security control testing of CLASS was completed in August 2007.

The CLASS system is classified as Mission Critical. CLASS has an approved System Security Plan, Risk Assessment, and Contingency Plan in place. Management, operational and technical security controls are in place to ensure the confidentiality, integrity, and availability of information.

2.5 Performance Measures

The performance measures in Table 2 show the CLASS program's performance with respect to Strategic and Business Results. Strategic and Business Results performance measures introduced in FY2007 include monthly Earned Value Management reports reviewed by NESDIS CIO staff. These measures align with the "Mission and Business Results Measurement Area", "Processes and Activities Measurement Area", and the "Technology Measurement Area" of the Performance Reference Model developed by the FEA-PMO.

Table 2: Business Results Performance Measures

Measurement Area	Indicator	FY2007 Baseline	Actual Result As of	Comments
Mission and Business Results	Increase availability of environmental data as measured by number of files in the catalog	Baseline of 9.55M files available. FY2007 target was to increase environmental data availability by 15% (target = 10.98M files available)	21.3M files available as of 06/30/07	Achieved 194% of target by third quarter of FY07
Processes and Activities	Capability Maturity Model Integrated Level	Formal independent assessment of Capability Maturity Model Integrated Level - 3	CLASS – Maryland achieved CMMI Level 3 in June 2007. CLASS West Virginia completed CMMI Level 3 SCAMPI-A and SCAMPI-B assessment by August 2007.	

Measurement Area	Indicator	FY2007 Baseline	Actual Result As of	Comments
Technology	Increase number NOAA sites with CLASS nodes	CLASS nodes in Suitland, MD (NSOF); Asheville, NC (NCDC); and Boulder, CO (NGDC).	Completed CLASS integration at NGDC (Boulder), and NSOF (Suitland)	

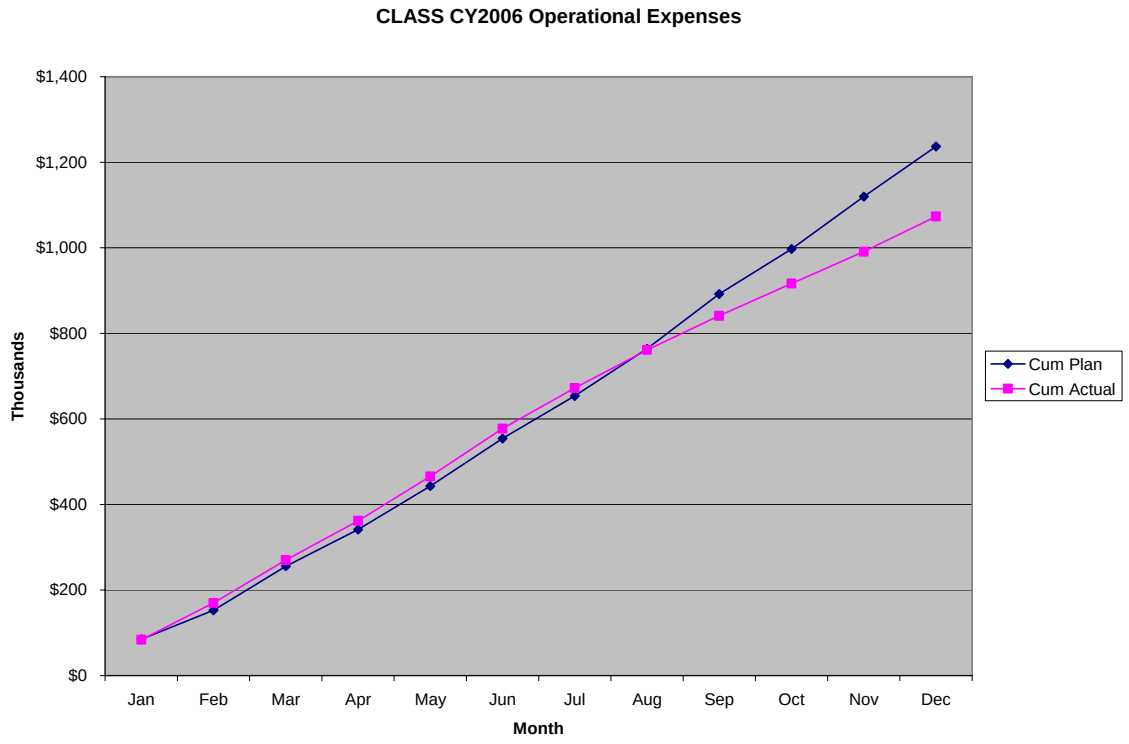
Other Alternatives. Currently, there are no other organizations capable of doing this work better, more efficiently, or at lower cost. Alternatives Analysis information is in the CLASS OMB Exhibit 300.

3.0 Financial Performance

3.1 Current Performance vs. Baseline

The current CLASS financial performance, see below, compares actual cost of the program compared to a pre-established cost baseline (i.e., annual spend plan). Financial performance information is provided for FY2007. The CLASS program plans and executes budget based upon a fiscal year calendar.

Note: The FY07 Steady State IT monthly planned and actual cost data will be added by CLASS Program Manager Rick Vizbulis when he returns to the office from the Source Selection Review. The chart below contains the FY06 data.



3.2 Performance Measures

The current CLASS financial performance is based on a pre-established cost baseline (e.g., annual spend plan). Program operational costs consist of contractor labor dedicated to CLASS, travel, communications and corporate overhead. During FY2007 the CLASS program consistently stayed within a ten percent variance.

3.3 Financial Performance Review

Financial performance is typically subjected to a periodic review for reasonableness and cost efficiency. Monthly budget reviews are held with the program manager, CORs and contract managers to ensure contracts are within cost and on schedule. Monthly reports from contractors are required to ensure the Government has the information it needs to evaluate cost performance. A detailed review of work and priorities is undertaken if cost is significantly above base lined values. Also, any necessary corrective actions are also identified and implemented.

4.0 Innovation to Meet Future Customer Needs

The following projects have been implemented in FY2007, or are being implemented in FY2008 to address future challenges, better meet customer needs, make better use of technology, and lower operating costs.

4.1 Improve Data Access

CLASS has implemented operational support for data collected by the Metop-A satellite. This mission was developed in partnership between NOAA and EUMETSAT and will serve the scientific community for years to come. By providing a single point of access for all Metop data, CLASS facilitates future search and ensures preservation of this very valuable data. CLASS is developing an Initial Operational Capability (IOC) for migrating selected data from the National Oceanic Data Center (NODC) into CLASS. The IOC will later be expanded to support all of NODC's data and will be used as a blueprint for migrating data currently stored in other data centers.

CLASS is migrating to a new hardware and network architecture that provides much more redundancy and significant performance improvements. This new architecture will have two fully operational nodes - one at the National Climatic Data Center (NDCD) and one at the National Geophysical Data Center (NGDC), and one point of presence at the NOAA Satellite Operations Facility (NSOF). The new hardware and network architecture will prepare CLASS to support the large data volumes expected from the NPP mission.

4.2 Improve Data Distribution

CLASS has enhanced its web interface to enable subscribers to manage their own subscriptions. This capability allows subscribers to more efficiently and effectively manage the data that is received via subscription services.

CLASS has embarked on a project to implement Application Program Interfaces (APIs) to allow the user community to access and retrieve data from CLASS without having to access CLASS web site. These APIs will allow the Data Centers, rather than CLASS, to develop highly customized user interfaces to support users who require specialized interfaces.

4.3 Develop and Implement New Technologies to Increase CLASS Capabilities.

During FY07 the CLASS Project Manager has been actively involved in NOAA's competitive acquisition of a new comprehensive CLASS system. In the second quarter of FY08, CLASS will announce the award of a major contract to provide contractor services on the following tasks:

- Transition from the current CLASS to the new system
- Program management
- Operations and maintenance of the current and new systems
- Software development and systems security
- Ad-hoc tasks

This is a competitive procurement for a ten year contract. During the next ten years, the number of CLASS funding sources and total funding dollars will increase because CLASS will take over the data archiving functions of many NESDIS systems. CLASS will receive funding from each of these systems in return for performing their data archiving. The funding that CLASS will receive from each of these systems will pay for the new IDIQ CLASS contract. CLASS provides a net saving and performance improvement to NOAA by replacing stove-piped legacy archiving systems with a modern centralized archive data management system.

Following the contract award, a CLASS Initial Baseline Review (IBR) will be conducted to create the new cost and schedule baselines to be used for Earned Value Management (EVM) of the CLASS project.