National Oceanic and Atmospheric Administration
Office of Science and Technology
Advance Weather Processing Information System
NOAA 8107
Operational Analysis
2009

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Executive Summary

This annual Operational Analysis (OA) report is a status review of the Advanced Weather Interactive Processing System (AWIPS) program in terms of financial performance, system performance, and customer results. The program continues to meet established cost, schedule and performance parameters and directly facilitates National Oceanic and Atmospheric Administration (NOAA)'s strategic goals.

The mixed lifecycle AWIPS O&M baseline consists of 169 individual AWIPS installations at 137 geographical locations across all 50 states, Puerto Rico, and Guam. AWIPS is the primary operational information technology (IT) system for the National Weather Service (NWS) Weather Forecast Offices (WFOs) and River Forecast Centers (RFCs) in all six NWS Regions. AWIPS also supports operations at four National Center for Environmental Prediction (NCEP) Centers; National Aeronautics and Space Administration (NASA)'s Spaceflight Meteorology Group (SMG), and supports training at the NWS Training Center and Cooperative Program for Operational Meteorology, Education and Training (COMET). AWIPS is critical to the NWS mission of providing climate, water, and weather forecasts and warnings for the protection of life and property and enhancement the national economy. Along with the field forecaster, AWIPS is critical in enabling the NWS to meet almost every NWS Government Performance and Results Act (GPRA) goal.

This report focuses on the operational state of the program as of September 30, 2009, and is based on guidance developed by the Department of Commerce. The AWIPS program directly supports NOAA's Strategic Goals to; a) "Serve society's needs for weather and water information", b) "Understand climate variability and change to enhance society's ability to plan and respond", and c) "Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation". The current program meets established cost, schedule and performance parameters.

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

1.0 Customer Results

Customer Satisfaction for 2009, as measured by our annual independent customer satisfaction survey was 96% for the year, exceeding the threshold of 86%. A chart showing the trend in AWIPS customer satisfaction, as measured by this survey, is shown below.

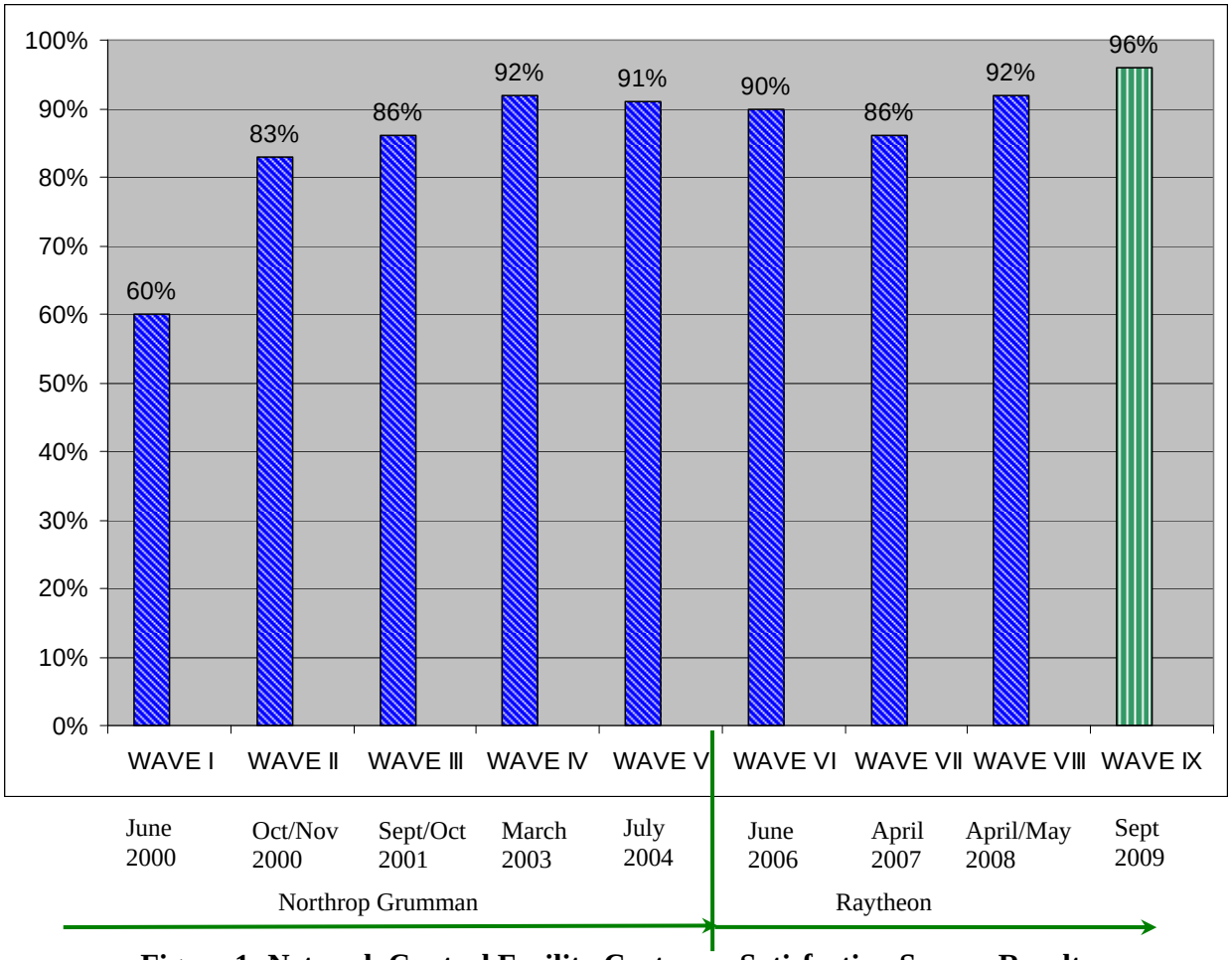

Figure 1: Network Control Facility Customer Satisfaction Survey Results

1.1 Customer Requirements and Costs

The primary customers of the AWIPS program are the field forecasters at our WFOs, RFCs, and NCEP. We strive to involve these customers or stakeholders to participate in all aspects of system management.

1.2 Performance Measures

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).

The following performance goals have been established to ensure that the AWIPS O&M investment continues to further agency goals and objectives:

Table 1: Customer Results Performance Measure

Measurement Area	Indicator	FY-09 Baseline	FY-09 Actual Result
Customer Requirements	Customer Satisfaction Survey	86%	92%
	Workstation Performance Rating (WPR)	99.5 secs	24.6 secs

2.0 Strategic and Business Results

The AWIPS 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 AWIPS program performs.

2.1 AWIPS Helps to Achieve Strategic Goals

The AWIPS program supports Expanded Electronic Government (E-Gov) through direct applicability to the Disaster Management PMA E-Gov Initiative related to the HazCollect and All Hazards (Weather) Radio projects and the AWIPS Wide Area Network (WAN) and NOAAPort are important data sources for NWS web farms, which are accessible through www.firstgov.gov. AWIPS supports the PMA Budget Performance Integration initiative because PAC investments are closely tied to GPRA performance measures.

The program continues to directly facilitate NOAA's strategic goals to; a) "Serve society's needs for weather and water information", b) "Understand climate variability and change to enhance society's ability to plan and respond", and c) "Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation"

2.2 Business Results

2.2.1 Program Management and Controls

The Office of Science and Technology (OST), within NOAA/NWS, uses several systems to measure and track AWIPS financial, schedule, and performance metrics. These systems, and the information they provide, have been key in managing the AWIPS program and in meeting our cost and schedule goals.

2.2.2 Monitoring Cost, Schedule and Performance

a. Cost: OST has oversight responsibility for the AWIPS Operations and Maintenance (O&M) budget. OST has managed this budget since the program was transferred from the NOAA Systems Acquisition Office to the NWS in 1999. Budget development and execution have been accomplished using PC-based spreadsheets (currently Microsoft Excel) linked to the NOAA financial management systems. These spreadsheets have been used to compare actual cost data to spend plans and budget models and to make the required model adjustments for subsequent

budget development cycles. OST Program Analysts have worked with the NWS Regions to understand AWIPS operations and to establish O&M budget priorities that ensures AWIPS helps to achieve NOAA's strategic goals at the lowest life-cycle cost and least risk. Cost and financial data are monitored to identify discrepancies with the approved financial plan and to develop corrective actions. The AWIPS prime contractor uses professional project management tools to track contract cost and schedule performance which is reported on a monthly basis. These data are also used to monitor contractor performance, contractor rate adjustments, support program/budget reviews, and to answer questions from NWS, NOAA, and Department Of Commerce management, Office of Management and Budget and Congress.

b. Schedule: There are typically three to four active software releases in some stage of development, testing or deployment at any one time. The AWIPS program plans these software releases as individual projects, using PC-based scheduling software (currently Microsoft Project) managing and coordinating efforts of the AWIPS prime contractor and Government development organizations. Once schedules are approved by the NWS senior management, they become the baseline used to measure project status. The prime contractor uses professional project management tools to track schedule performance and is reported monthly. The schedule status of these projects is reported to NWS senior management via OA Quad Charts and routine Major Investment Reviews.

c. Performance: System performance is routinely and systematically monitored by the AWIPS prime contractor and the NWS Systems Engineering Center. The AWIPS Network Control Facility (NCF) is contractor staffed 24/7/365 and supports all AWIPS sites in the network. Analysis of system performance, availability, and trouble tickets generated at the NCF is reported monthly in the Performance and Availability Report (PAR). Several key program level performance measures are tracked on a regular basis to determine the effectiveness of the program. Key performance measures are: (1) Workstation Performance Rating; (2) Average Message Latency; (3) Satellite Broadcast Network Availability; and (4) NCF Customer Satisfaction Survey Results.

In addition to the NWS AWIPS management structure, AWIPS is also subject to, and complies with, the Office of Management and Budget (OMB) requirements of Circular No. A-11, Planning, Budgeting, Acquisition, and Management of Capital Assets; and NOAA's Planning, Programming, Budgeting, and Execution System.

2.3 Reviews

AWIPS receives executive level guidance from the NWS Corporate Board which establishes direction from an operations perspective for the program. There is a dedicated AWIPS Program Manager who manages the day to day operations and maintenance and technical evolution of the system within the strategic guidance provided by the NWS Corporate Board.

Changes to the system configuration and new requirements are carefully managed by the AWIPS Configuration Control Board (CCB), which is chaired by the AWIPS Program Manager. Each Region and NWS Office has a voting representative on the CCB and that person is allowed to submit proposed changes. Subordinate to the CCB are several technical management Integrated Product

Teams (IPTs), including the AWIPS Partnership IPT, the Software Engineering Working Group (SwEG), and the Software Requirements Evaluation Committee (SREC).

This ensures the AWIPS O&M investment is exposed to a rigorous review and decision making process that assesses AWIPS performance relative to its contributions to NOAA's strategic goals and that it continues to be a viable and worthy investment.

2.4 Security

The AWIPS Network is accredited under requirements spelled out in NOA 212-13 (08/06/90) and National Weather Service Information Technology Security Policy NDS-60-7 (August 5 2005) that are based on OMB and National Institute of Standards and Technology (NIST) guidance. System Security Plans, Risk Assessments, and Contingency Plans were certified and approved for the AWIPS Program in August 2008. Management, operational, and technical security controls are adequate to ensure the confidentiality, integrity and availability of information. Authority to Operate was granted by the NWS Assistant Administrator on May, 2009.

2.5 Performance Measures

The performance measures in Table 2 show the AWIPS Program's performance with respect to Strategic and Business Results. 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	2009 Baseline	2009 Actual Result
Strategic and Business Results	Workstation Performance Rating	99.5 secs	24.6 secs
	Average Message Store Time	60 secs	11.5 secs
	Satellite Broadcast Network Availability	99.5%	99.9%

3.0 Financial Performance

3.1 Current Performance vs. Baseline

An annual, recurring O&M investment of $36.1 M provides for a high system availability and would sustain an excellent level overall AWIPS customer satisfaction, however, congressional reduction of $1.9 M/yr in this O&M funding in FY09 has caused us to defer important sustaining engineering activities. This O&M investment must continue in order for NOAA to meet its Strategic Goals of a) "Serve society's needs for weather and water information", b) "Understand climate variability and change to enhance society's ability to plan and respond", and c) "Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation"

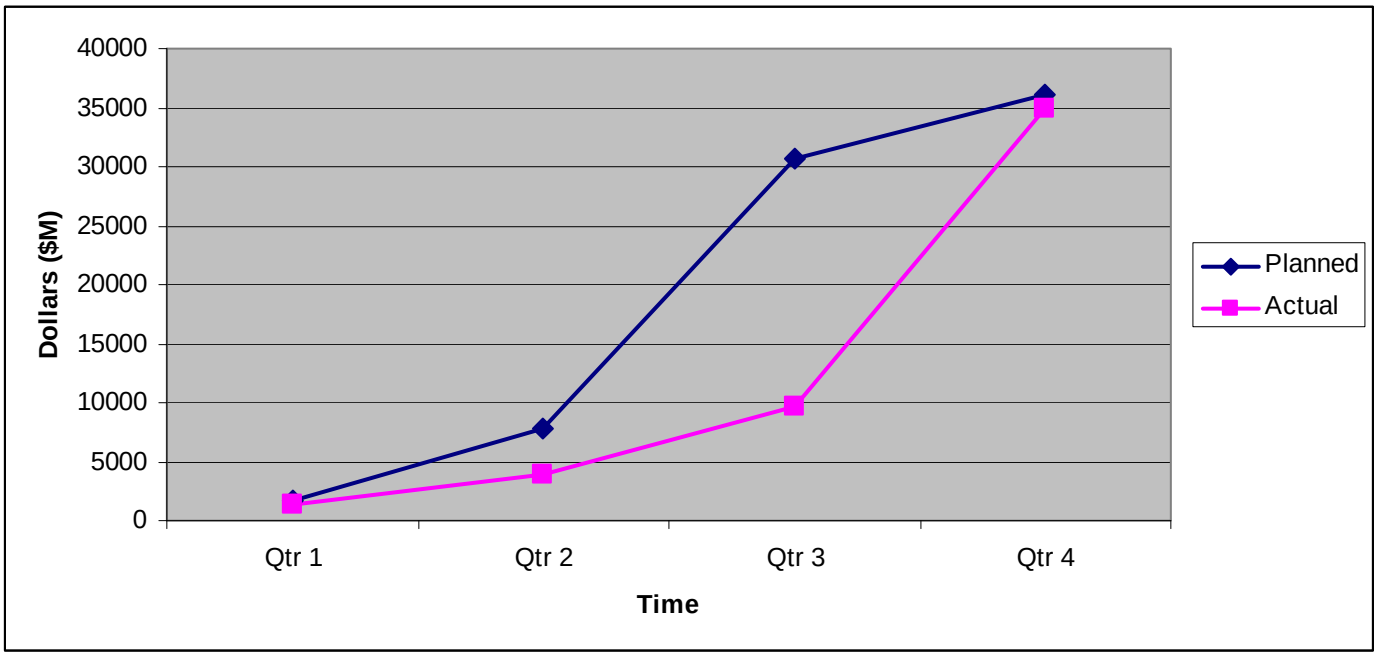

Figure 2: Planned versus Actual Costs

3.2 Performance Measures

The AWIPS program has been presented as a model Departmental program, to OMB, from a cost/schedule control perspective. The AWIPS program developmental work has been relatively low risk and involved primarily the replacement and upgrade of Commercial off the Self hardware and communications equipment, and the work is actively managed jointly by the Government and Contractor by breaking the work down into relatively small pieces and carefully tracking performance against a cost and schedule baseline. The Government also carefully manages the system requirements that are levied on the Contractor to prevent "requirements creep" that often get programs into trouble.

The work is Operations and Maintenance of the AWIPS Network so generally; there is very little risk. For this reason the program is a "Mixed Life Cycle" O&M program from an OMB perspective. New work scope proposed in response to the AWIPS-R solicitation includes:

- A Software Maintenance and Support that was not included in the legacy AWIPS O&M contract and,
- Software re-engineering plan that was bid under the Continuous Technology Refresh (CTR) option.

In general the CTR portion of the contract carries more risk than the O&M components. The highest risk project in the AWIPS contract is the software re-engineering CTR task, which is estimated to take 4 years to complete. The following controls have been put in place on AWIPS-R to prevent future cost and schedule overruns:

- A requirement for a contractor Earned Value Management System that is compliant with the ANSI/EIA 748 standard.
- Government staff that is experienced in EVMS reporting and controls.
- Firm Fixed Price (FFP) is used for all O&M contract activities placing most of the risk on the contractor.
- The $29.6M Software Re-engineering task (which carries the most cost/schedule risk) is approximately 10% of the total contract cost and it is being executed as a series of relatively small FFP tasks. Each task will be sequentially authorized after successful completion of earlier tasks.
- The Quality Assurance Surveillance Plan (QASP) that monetarily rewards the contractor for good performance and provides monetary disincentives for poor performance. The QASP has stringent thresholds set for the Contractor, such as a requirement to deliver zero critical software defects to our field sites after software testing.

3.3 Cost Benefit Analysis

More and more sectors of the economy recognize the impacts of weather and water on their businesses, and are becoming more sophisticated at using weather and water information to improve performance. Concern for public safety drives NWS to improve the timeliness and accuracy of warnings for all weather-related hazards. To do so, NWS weather and water predictions need to be at the limits of what science, technology, and a highly trained workforce can provide. NWS is committed to expand these limits by enhancing observing capabilities and by improving data assimilation to effectively use all the relevant data NWS and others collect; by improving collaboration with the research community through creative approaches such as community modeling; by rapidly transforming scientific advances in modeling into improved operational products; by improving the techniques used by our expert forecasters; by making NWS information available quickly, efficiently, and in a useful form (e.g., the National Digital Forecast Database); by including information on forecast uncertainty to help customers make fully informed decisions; by taking advantage of emerging technologies to disseminate this information; and by maintaining an up-to-date technology base and a workforce trained to use all of these tools to maximum effect. However, the entire weather and water enterprise is larger than NWS – today and tomorrow the NWS depends on partners in the private, academic, and public sectors (starting with other line offices within NOAA) to acquire data, conduct research, provide education and training, help disseminate critical environmental information, and provide advice to make best use of NWS information. NWS will work even more closely with existing partners, and will develop new partnerships to achieve greater public and industry satisfaction with our weather and water information and to honor our commitment to excellent customer service.

3.4 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, Contract Officer's Representatives 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 to address future challenges, better meet customer needs, make better use of technology, and lower operating costs.

- AWIPS PX Server Replacement
- AWIPS Network Attached Storage Replacement
- Software Task Order 10
- Considerable progress on Software Task Order 11
- Software Task Order – Deployment and Transition Planning

4.1 Number and Types of Users

Internal to the NWS there are approximately 2500 AWIPS users, however the AWIPS NOAAPort satellite broadcast network provides meteorological and hydrologic data and information to thousands of users external to NOAA.

Project to Address Challenge: ***Expanding Observing and Forecasting Capabilities***

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To meet this challenge the AWIPS Program will increase accuracy and amount of lead time for severe weather (by category of storm type, e.g. hurricanes) which will result in the follow:

- Saved lives and property through more accurate and timely severe weather prediction
- Increased satisfaction with and benefits from NOAA information and warning services, as determined by surveys and analysis of emergency managers, first responders, natural resource and water managers, public health professionals, industry, government and the public.

- Increased number of observations obtained and used from partners, both international and domestic.
- Increased number of observations archived, available, and accessible.
- Increased number of new multi-use observing systems deployed.
- Improved effectiveness of NOAA's observing systems.
- Increased number of forecasters trained in the newest techniques.
- Increased volume of forecast and warning information formatted to clarify the uncertainty of an event (e.g., space weather, air quality, water and weather forecasts).

4.4 Funding Levels

Recent trends in government spending indicate that agencies should not expect significant increases in their budgets. This, coupled with the requirement to accommodate more users and incorporate evolving technology, will force the program to find efficiencies and to do more with the same amount of resources.

The AWIPS FY09 appropriated budget of $36.2 M (reduced from the president's budget by over $1.9M) was sufficient to maintain current operations; however, some important sustaining engineering projects had to be deferred due to this reduction. Government FTE labor costs and corporate costs are an increasingly large burden that will begin to affect program execution if labor costs continue to escalate at the current rate, and the budget reductions (from the President's Budget) are sustained in future fiscal years.