

National Oceanic and Atmospheric Administration
Office of Science and Technology
Advance Weather Processing Information System
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Operational Analysis
2010

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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 172 individual AWIPS installations at 150 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 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 of the national economy. Along with the field forecaster, AWIPS is critical to 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, 2010, and is based on guidance developed by the Department of Commerce. The AWIPS program directly facilitates 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" (*NOAA Strategy Plan FY2009-2014*). 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

1.1 Customer Requirements and Costs

The primary customers of the AWIPS program are the field forecasters at the National Weather Service (NWS) Weather Forecast Offices (WFOs), River Forecast Centers (RFCs), and National Centers for Environmental Prediction (NCEP).

1.2 Performance Measures

The following performance 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: Customer Results Performance Measure

Measurement Area	Indicator	FY-10 Baseline	Last Actual Result
Customer Requirements	Customer Satisfaction Survey	87%	96%
	Workstation Performance Rating (WPR)	99.5 secs	24.5 secs

The Customer Satisfaction Survey was not conducted during FY2010. In FY2009, a Customer Satisfaction, as measured by an independent customer satisfaction survey, resulted in a 96% overall satisfaction with the Network Control Facility by the field forecaster which exceeded the threshold of 86%. A chart showing the trend in AWIPS customer satisfaction, as measured by this survey, is shown below.

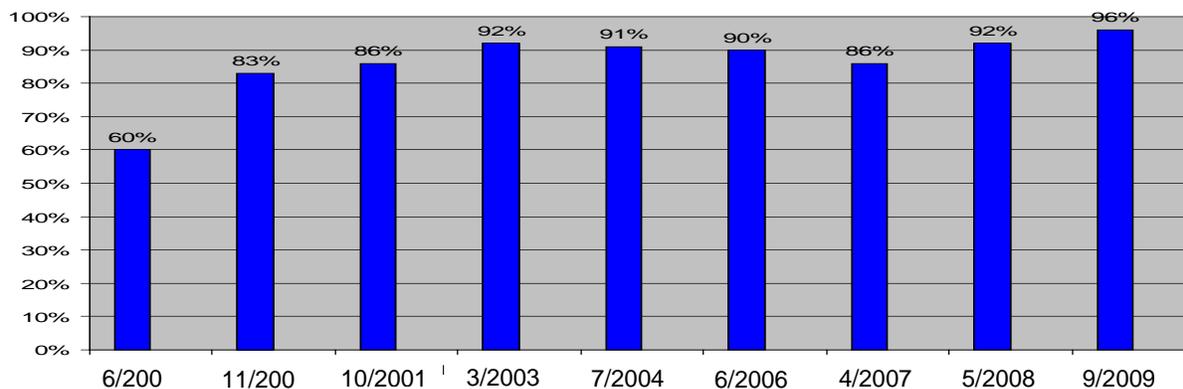


Figure 1: Network Control Facility Customer Satisfaction Survey Results

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 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 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” (*NOAA Strategic Plan FY2009-2014*). AWIPS is the primary information technology system in support of the NWS’ Mission to save life and property.

2.2 Business Results

2.2.1 Program Management and Controls

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 linked to the NOAA financial management systems. These spreadsheets have been used to compare actual cost data to spend plans and to make the required adjustments for subsequent budget development cycles. The program works with NWS regions to understand AWIPS operations and establish O&M budget priorities that ensure AWIPS helps to achieve NOAA’s strategic goals at the lowest life-cycle cost and least risk. Cost and financial data are monitored monthly 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: At this time, the next major upgrade of the software is in association with the AWIPS II project so the operational AWIPS software is under a freeze from implementation of major new enhancements. This freeze does not apply to routine maintenance of the software to correct operational discrepancies. During FY2010, the AWIPS program released 3 major software maintenance releases to support the operational system. In addition, the program refreshed selected hardware components based on the sustaining engineering plan. Each of these individual activities are coordinated and tracked between the Government and AWIPS prime contractor using PC-based scheduling software (currently Microsoft Project). The prime contractor uses professional project management tools to track schedule performance and is reported monthly. In addition, these schedules are reviewed with NWS Headquarter stakeholders in a weekly and monthly basis. The schedule status of these projects is reported to NWS senior management via OA Quad Charts and routine Major Investment Reviews. Table 2 contains some of the key NWS AWIPS O&M FY2010 Annual Operating Plan milestones

Table 2: FY2010 AWIPS O&M NWS AOP Milestones

Milestone	Target Quarter	Actual Quarter	Comments
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Milestone	Target Quarter	Actual Quarter	Comments
Deploy 2 VSAT to geographically dispersed areas from Globecom facilities to support Katrina Wide Area Network (WAN) backup	Q4	Q4	The milestone for the AWIPS VSAT WAN Backup is completed. All 4 units are ready of deployment, if we have a catastrophic event that may cause a major communication outage. Globecomm manages and maintains the units at their Headquarters in Hauppauge, New York. OST/SEC is working with Raytheon to have 2 of the 4 deployable units to be stored at another one of Globecomm's facilities.
Initiate proof of concept for National Polar-orbiting Operational Environmental Satellite System (NPOESS) Satellite Broadcast Network (SBN) upgrade	Q4	Q4	Able to purchase more bandwidth than originally planned, due to favorable market conditions and tough negotiation.
Complete Advanced Weather Interactive Processing System (AWIPS) II Workstation Operational Testing and Evaluation (OT&E)	Q3	Q3	
Complete Advanced Weather Interactive Processing System (AWIPS) NOAAnet Migration	Q3	Q3	Multiyear project.

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. AWIPS management team participate in joint contractors review meetings on a bi-weekly basis. In addition to the NCF, additional contractor technical support comes in the form of Raytheon participation in Integrated Work Teams, Technical Interchange Meetings, and Partnership Integrated Product Team with Government Labs and/or NOAA/NWS organizations.

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 O&M 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).

NWS' Office of Science and Technology conducts weekly reviews of risk areas associated with the AWIPS projects and activities. In addition, a comprehensive review of the AWIPS program is conducted on a monthly basis. The monthly review is attended by stakeholders from the NWS headquarters offices including OCFO and OCIO.

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 NOAA Administrative Order (NAO) 212-13 (March 7, 2003) and National Weather Service Information Technology Security Policy NDS-60-7 (August 5, 2005) that are based on Office of Management and Budget (OMB) and National Institute of Standards and Technology (NIST) guidance. System Security Plans, Risk Assessments, and Contingency Plans are certified and approved for the AWIPS Program. 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 4, 2009.

In fiscal year 2010, the AWIPS program completed its annual Continuous Monitoring requirements, to include control testing, Contingency Plan update & test, policy review and System Security Plan update. In addition, a penetration test was conducted by an independent assessor. The penetration test was unable to penetrate the exterior firewalled perimeter of the AWIPS network.

2.5 Performance Measures

The performance measures in Table 3 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 3: Business Results Performance Measures

Measurement Area	Indicator	2010 Baseline	2010 Actual Result
Strategic and	Workstation Performance Rating	99.5 secs	24.6 secs

Measurement Area	Indicator	2010 Baseline	2010 Actual Result
Business Results	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 \$39.346M provides for high system availability and sustains an excellent level overall AWIPS customer satisfaction. This O&M investment provide base contract support: O&M support of AWIPS, including 24/7 Networking Control Facility, Satellite Broad Network, Software Integration and Test, and Sustaining engineering and hardware refresh.

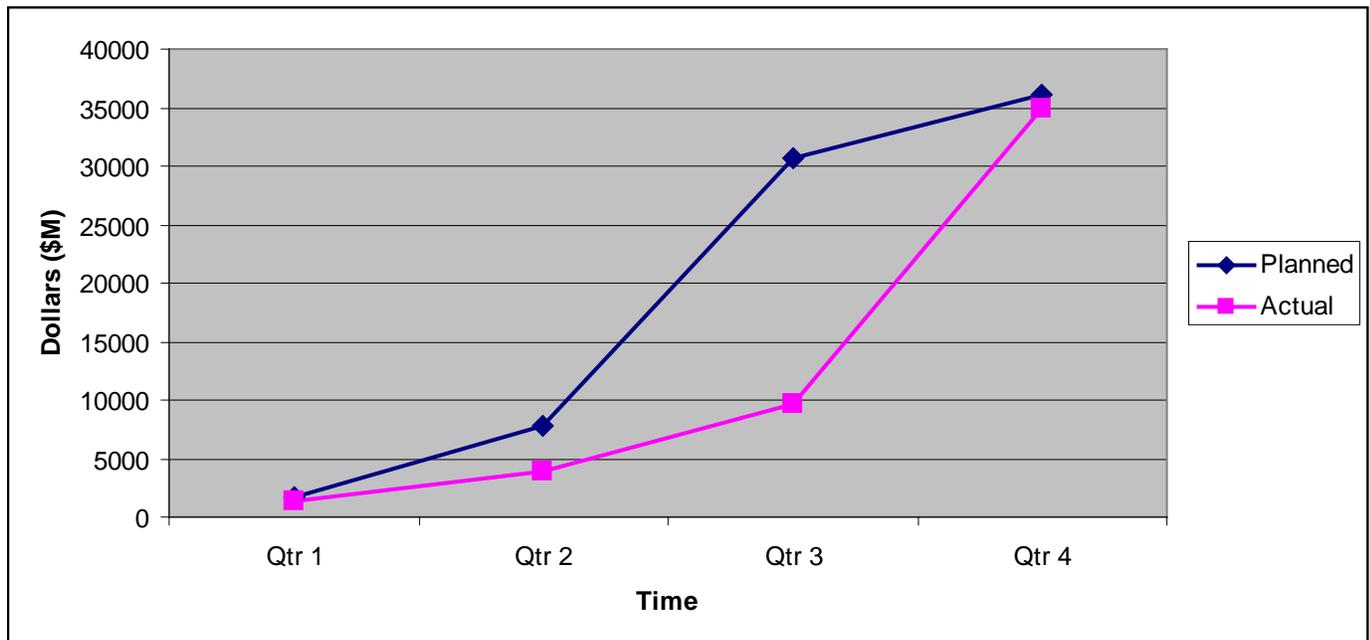


Figure 2: Planned versus Actual Costs

3.2 Performance Measures

The ongoing O&M work is relatively low risk and involves primarily the activities to support AWIPS, including 24/7 Networking Control Facility, Satellite Broad Network, Software Integration and Test, and Sustaining engineering and hardware refresh. These activities are 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.

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 contract managers, and other key stakeholders 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

4.2 [Other – AWIPS II; AWIPS II Extended; AWIPS II Extended Phase II; and Forecaster Tools and Applications]

Project to Address Challenge: Re-architecture of AWIPS Software Infrastructure

The objective of this project (known as AWIPS II) is the migration of current AWIPS capabilities into a Service Oriented Architecture (SOA). The project will realize the following benefits to the AWIPS program:

- Improve maintainability and stability via streamlined, extensible software
- Reduce average time to transition new science and capabilities to the forecasters, from 18 months to 9 months
- Reduce software development time for new products by 50%
- Increase software release frequency from 2 to 4 per year

Currently, this project is expected to begin deployment in Q1FY12.

Project to Address Challenge: Implement on-going pre-planned, major infrastructure enhancements to AWIPS (i.e., AWIPS II Extended)

The objective of this project is two fold 1) Extend AWIPS II architecture to the entire NWS weather enterprise and 2) Implement system-wide infrastructure enhancements. The first objective enables a more seamless product suite among NWS operational centers, e.g., National Centers, WFO's and RFC's and improves efficiencies in developing new capabilities that can be used across the NWS weather enterprise. The second objective supports the implementation of the following capabilities:

- Smart Push/Pull technologies to enable AWIPS to handle increased data volumes associated with major agency initiatives, e.g., GOES-R, Higher resolution models, etc.
- Real-time collaboration among NWS operators and between NWS operators and partners, e.g., Emergency Managers to support improved product consistency, quality and decision assistance
- Streamlined information generation dissemination and access for partners to support decision assistance
- Improve data visualization to support situational awareness and decision assistance

Some of the activities associated with AWIPS II Extended began in FY2009. The deployment dates range from Q1FY12 to Q4FY14.

Project to Address Challenge – AWIPS II Extended Phase II: Implement additional infrastructure enhancements to address existing and emerging NWS mission requirements

The objective of this project is as follows:

- Ingest numerous new and enhanced datasets, advanced decision assistance systems
- Improve system robustness to support more agile infusion of new science and technology into the system and to improve collaborative development across the hydrometeorological community

This project is currently scheduled to kick-off in FY11. The AWIPS Program is engaging in prioritization, high-level requirements analysis, and planning for each of the individual activities.

Project to Address Challenge – Forecast Tools and Applications: Infuse new science and applications to improve forecast accuracy and consistency.

The objective of this project is to continue the infusion of new science and applications into NWS operations. This project is currently scheduled to kick-off in FY11. The AWIPS Program is engaging in prioritization, high-level requirements analysis, and planning for each of the individual activities.

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.