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Air Force Weather Net Enabled Operations

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Air Force Weather (AFW) is building a net-centric weather capability as part of the Department of Defense's Global Information Grid (GIG) data management strategy. This capability will speed up decision-making processes by providing decision-quality weather information in a machine-to-machine (M2M) ready format allowing users to run automated decision rules and receive reliable, consistent answers. These decision rules will use risk management techniques based on user defined thresholds to maximize mission efficiency, effectiveness and safety.

AFW has an initial limited M2M capability today for our most commonly used weather data (weather observations and gridded forecasts). The Air Force Weather Agency (AFWA) provides this M2M data using a consistent, scaleable, request and reply interface implemented as an industry standard web service based on extensible markup language (XML). This interface is referred to as the "Joint METOC Broker Language" (JMBL). Both the JMBL interface and supporting data structure are implemented and defined by using XML. A supporting XML schema, associated conceptual data definitions and physical database design are divided into 12 mutually supporting data segments. Each data segment is specified to house and deliver a major sub-category of weather data. The 12 JMBL weather data segments were jointly designed by and are configuration managed by the DoD through a Joint Meteorology and Oceanography Board (JMB). In addition to the 12 weather segments, additional segments are tailored for oceanographic data. AFW is using JMBL as the standard net-centric weather interface to mission planning systems (MPS) and command and control (C2) systems. M2M is vital to meeting the AF's ever decreasing decision cycle timeline.

AFW has implemented 2 of the 12 weather data segments and partially implemented 2 additional segments of the full capability necessary for M2M weather data delivery. When all 12 segments are completed by 2013, all necessary data will be fully ready for users to inject weather data at key decision points in mission planning and execution processes. The highest priority weather data segments will support many user needs well before 2013. Weather data in JMBL format enables it to be a key parameter in the decision-making process because the data is on the decision-maker's C2 system where and when he needs it. In the near term C2 systems will pull data from a local database and transition to full net-centricity as the GIG becomes more robust.

JMBL eliminates the need for custom point-to-point interface control documents by allowing multiple users to use the same data interface for request and reply services using built in options that allow common data tailoring for multiple application purposes. As an example of the data segment flexibility and reuse, the climatology segment will be used in the Air and Space Operations Center (AOC) Strategy Division to determine optimal areas for specific operations more than 72 hours prior to execution. Data in the same climatology segment can be used by civil engineers to determine where to build a temporary airfield, heating/cooling requirements and suitability of existing infrastructure.

Additional services can be requested by users and will be implemented when common interests and resources allow development of additional capability. JMBL flexibility as a web service allows ongoing data services enhancement limited only by the resources needed to implement the requested changes. JMBL services are designed to be additive in nature to protect users' functionality implemented within earlier releases of JMBL.

AFW is overhauling internal meteorological processes to be ready for the increased speed in the decision making process. Forecasters will apply risk management techniques prior to data entering the GIG. Specifically, forecasters at global and regional forecast centers will use ensemble techniques and confidence intervals to determine where human forecaster intervention is necessary. When the model forecast confidence is high, forecasters will allow the output to enter the GIG as is. When model forecast confidence is low in an area where the DoD has an operational interest, forecasters interact with the model and develop value added forecast products. If the forecast confidence is low and the DoD does not have an interest in that area, the forecaster will allow the data to enter the GIG as is. The weather community will develop a methodology for domain authority so all users, any where on the globe, get the same environmental data.

In the M2M era, users will pull data from the GIG and apply automated decision rules on their systems. Risk factors change for each mission so none of the decision rules will be hard coded to allow decision-makers the flexibility to assess the risk of each mission. By 2015, the Air Force will have a world-wide ensemble capability allowing more forecasters to change their focus to environmental impacts on operations. Their role shifts from meteorological production to environmental consultant providing options when automated decision rules do not suggest an alternative or if decision-makers need assistance for mitigation when impacts for planning specific missions.

The DoD, DOT and DOC are partnering to leverage the capabilities each has to offer and gain efficiencies through the smart use of resources. This synergy prepares the way for a US Government weather datacube that provides consistent answers and similar forecast processes among the various agencies. Focused model development, algorithm development, net-centric capability exploitation and forecast process improvement will ultimately lead to more efficient use of airspace, effective aircraft movement and safe operations within the US and across the globe.

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