Aeronautical Information Management

Federal Aviation Administration

Notice to Airman

Industry Day

Date: May 21, 2007

Welcome

Federal Aviation Administration

Nancy Kalinowski

Director of Airspace and Aeronautical Information Management

Welcome

Federal Aviation Administration

Department of Defense

Fred Pease

Executive Director Department of Defense Policy Board on Federal Aviation

Agenda

- **The Journey**
- **Department of Defense Welcome**
- **Presentations**
  - Summary of 2006 Activity Value Analysis
  - Summary of Customer Benefits Survey
  - Modernizing the US NOTAM System
  - The Future : Digital NOTAMs
- **Questions**

Aeronautical Information Management

Federal Aviation Administration

Activity Value Analysis

Industry Day

Gary L Prock, AIM Systems

Overview

- Booz Allen and its FAA partners conducted an Activity Value Analysis (AVA) of the National Airspace Aeronautical Information Management (AIM) Systems (formally known as NAIMES)
  - Engaged AIM customers via focus group interviews and surveys (app. 33 groups)
  - Conducted data collection with AIM system contractors
  - Review findings from customer groups and systems analysis
- Results of the AVA
- Recommendations

The AVA Team analyzed the use of AIM Systems information across four external customer groups including FAA, Military, Airlines and GA

Customer Group Type	Customer Group	Description (Customer Description)
FAA	ATCSCC	Air Traffic Control System Command Center (ATCSCC), often referred to as the Command Center, manages the flow of air traffic through the NAS.
	ARTCC	Air Route Traffic Control Center (ARTCC), also known as a Center, is the facility responsible for controlling aircraft en route in a particular volume of airspace at high altitudes between airport approaches and departures.
	TRACON	Terminal Radar Approach Control (TRACON) or Terminal Control Center, controls aircraft within a 30-50 nautical mile radius of an airport between the surface and 10,000 feet.
	Towers	Towers are the air traffic control unit responsible for plane movements around an airport.
	FSS/AFSS	Flight Service Stations (FSS) and Automated Flight Service Stations (AFSS) are air traffic facilities which provide pilot briefings regarding current weather and possible hazards along a route of flight.
	Aviation System Standards (AVN)	AVN is responsible for development of instrument flight procedures (IFPs), publishing of aeronautical charts and digital products for air carrier and general aviation pilots.
Military	NOTAM Office	Military assigned to publishing Military NOTAMS into the Civil NOTAM system. This includes military assigned to the FAA ATCSCC USNOF and Global Positioning System Operations Center (GPSOC)
	Base Ops	Base operations is responsible for issuing Notices to Airmen for flight hazards or restrictions at an airfield or in the airspace that would pose safety of flight problems to pilots flying to the local airfield or through the airspace.
	NORAD	North American Aerospace Defense Command (NORAD) is a bi-national United States and Canadian organization charged with the missions of aerospace warning and aerospace control for all of North America.

Source: Booze Allen AVA Survey

The AVA Team analyzed the use of AIM Systems information across four external customer groups including FAA, Military, Airlines and GA

Customer Group Type	Customer Group	Description (Customer Description)
Airlines	Majors	Airlines with revenue in excess of $1B and may have thousands of departures daily, domestic and international.
	Regional	Regional airlines are a type of airline service that is intended to feed a larger airline. Usually comprised of air service between small communities that are not able to support larger aircraft.
	Organizations	Associations or groups dedicated to representing airlines and the suppliers of products and services that support the industry, before federal and state agencies.
	Cargo	Cargo airlines (or airfreight carriers) are airlines dedicated to the transport of cargo. Some cargo airlines are divisions or subsidiaries of larger passenger airlines.
General Aviation	Business Aviation	Professional business flight operations under FAR Part 91, including fractional aircraft operating units and single pilot operations.
	Charter	A charter airline operates on-demand flights that take place outside normal schedules, by a hiring arrangement with individual customers. Part 135 and 91
	Schools	Provide aviation training and pilot services.
	GA Pilots	The term general aviation describes any flight other than a military or scheduled airline flight, ranging from gliders to large, non-scheduled cargo jet flights.
	Organizations	Groups whose membership consists mainly of general aviation pilots.

Source: Booze Allen AVA Survey

NAIMES Customer feedback was captured from 33 Focus Groups across the four customer groups

FAA	ATCSCC	ARTCC	TRACON	Towers	FSS	Other
	CARF	Memphis	Potomac	Colorado Springs	AK- Kenai	ASS
	USNOF	Denver	Oklahoma City	Paine Tower		
	USNS	Chicago	Seattle	Merrill Field		
		Anchorage	Colorado Springs			
		Ft. Worth				
Military	**NOTAM office**	**Base Ops**	**NORAD**	**Other**		
	DoD	Elmendorf AFB	Peterson AFB	Scott AFB		
	GPSOC (GPS)					
Airlines	**Majors**	**Regionals**	**Organizations**	**Cargo**		
	United	Colgan	RAA	FedEx		
	Jet Blue	Air Wisconsin				
	Alaska					
	American					
General Aviation	**Schools**	**GA Pilots**	**Organizations**			
	AV-ED	Through AOPA	AOPA			
	Dulles Aviation					

Source: Booze Allen AVA Survey

Analysis of the findings revealed a series of issues and themes common throughout the NAIMES program, identifying Service Quality Gaps

Qualitative and Quantitative Findings

Issues	Themes
• Accuracy • Availability • Communication • Content • Customer Service • Ease of Use • Format • Timeliness	• Inconsistent NAIMES system usage • Manual, time consuming processes • Reliance on 3rd party solutions • NAIMES not primary NAS data source • Custom, in-house work-around solutions • Ineffective communication across users • Full trust in information purveyed • Insufficient Feedback Processes

Source: Booze Allen AVA Survey

Results of the AVA/1

Theme 1 – Inconsistent usage of NAIMES systems

- Inconsistent use of NAIMES was common across many of the NAIMES user groups. Many use 3rd party software programs to provide flight planning information because their programs were easier to use. Also, several users verify information with multiple sources to insure NAS information accuracy.

Theme 2 – Manual and time consuming processes

- The use of manual and time consuming processes are prevalent across all NAIMES user groups. Users consistently reported the use of faxes, email, and phone calls to access content, validate accuracy, and resolve timing issues.

Theme 3 – Reliance on 3rd Party Solutions

- Customers rely upon outside vendors to provide aeronautical information because quality control provided by vendors added an additional level of accuracy. Vendors updated systems based on customer feedback and business requirements.

Theme 4 – NAIMES is not always the primary source of NAS data

- Inconsistent use of NAIMES was common across many of the NAIMES user groups. Many use 3rd party software programs to provide flight planning information because their programs were easier to use. Also, several users verify information with multiple sources to insure NAS information accuracy.

Results of the AVA/2

Theme 5 – Customized internal systems provide workaround solutions for users

- Issues with accuracy of NAS information in NAIMES requires users to implement their own quality control. Additionally, workaround solutions allow users to filter unwanted data.

Theme 6 – Trust in Information Purveyed

- Users do not fully trust NAIMES data. The perception that the NAIMES system does not always contain the most up-to-date, real-time information.

Theme 7 – Ineffective Communication Across Users

- NAIMES does not have a distribution method for disseminating system information to front line user groups, such as the recent changes to AISR and pilot web, therefore notifications and updates are not communicated effectively.

Theme 8 – Insufficient Feedback Processes

- No feedback mechanisms exists to collect consumer complaints from external users for change requests.

Recommendations

Recommendation 1 – Clarify and Define FAA Service Offerings –

Determine the level and type of aeronautical services and information the FAA will provide through the NAIMES office, and to whom.

Recommendation 2 – Improve the Integrity of NAIMES Data –

Address the shortcomings in NAIMES data that cause customers to dedicate resources to conduct quality control.

Recommendation 3 – Establish and Execute a Communications Strategy –

Let the aviation community know about current products and plans for the future.

Recommendation 4 – Implement a Comprehensive Customer Feedback Mechanism

Establish feedback mechanisms to measure satisfaction, maintain service quality and provide input into the NAIMES program.

Boss for a Day

What Changes would you make?

- **Disseminate NOTAM L's like NOTAM D's**
- **Make NOTAMs easier to read**
- **Parse NOTAMs so that users can see and use just what they want**
- **Don't cancel NOTAMs when published (eg: NAVAIDS)**
- **One Stop Shopping for Aeronautical Information.**
- **Follow ICAO Standards**

Aeronautical Information Management

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Summary of Airline Survey Responses

Industry Day

Alan Hayes, AIM Programs

Background

- Survey of Air Carriers and Data Providers was conducted to better understand their usage of Aeronautical Information (AI) received from the FAA
- Survey results will be used by the AIM Program as part of the justification for building a more robust AI system for the NAS
- Eight Domestic Airlines, Air Carriers, and Data Providers; Fourteen International Airlines and Air Carriers responded to our survey request
- Most of the questions centered on their usage of NOTAM data.

Summary of Airline Responses (Highlights)

What are the fundamental difficulties that your Company/organization experiences with NOTAM Data?

- Too many data formats (such as ICAO and US NOTAM “D”)
- Local NOTAM messages are not electronically distributed
- U.S. NOTAM Messages are not ICAO compliant (Invalid or incomplete Q-Codes)
- Content can use non-standard acronyms and confusing
- NOTAM messages not always distributed in a timely manner
- NOTAM messages are still text based yet many of them require graphic references
- Current Special Use Airspace (SUA) data is not available in a machine readable format
- International access of US NOTAM information
- Pilots want plain language NOTAM messages

Does the lack of data availability (e.g. local NOTAM messages, etc.) cause you to expend resources to collect the data?

- **All the air carriers do expend resources to collect and validate, resulting in inefficient flight planning and en route advisories.**
- **Issues include:**
  - Local NOTAM and ramp/runway field conditions not readily available
  - Lack of awareness on SUA activity causing flights to be planned around non-active and available airspace
  - Airspace Facility Directory (AFD) and Notice To Airman Publication (NTAP) entries in book form are impossible to integrate and maintain in automated systems
  - Multiple sources of information. A lack of a central source for information makes the entire process more lengthy and may cause additional reroutes or delays
  - Missing, incomplete, incorrect, outdated information may influence route planning as well as alternate selection
  - Delivery of paper documents to international air carriers may take several weeks
  - Extra personnel is necessary to clarify information
  - Expiration of NOTAM messages should be more precise i.e. some messages show a 3 month-estimate and are cancelled 2 days later while others are estimated for a short period, but remains active for 3 months or longer

Does the timeliness of translating the data from receipt to dispatch functions result in inefficient flight planning and en route advisories?

- **Most of the air carriers who responded stated that translating the data does effect the flight planning and en route advisories.**
- **Issues include:**
  - The volume of NOTAM messages now being issued is becoming quite unmanageable in terms of restrictions and limitations
  - Lack of Local NOTAMs continue to be a safety of flight issue
  - Information extracted from FDC/NFDD often gets manually processed and sorted before it is used.
  - Timelines and lead times are critical functions required of data disseminated to final users
  - Following the ICAO Standard NOTAM procedures would help to process data in an electronic format in all quality matters, i.e. time, accuracy, completeness, and traceability

Are there any additional issues associated with the aeronautical data processing and delivery system?

- **Issues include:**
  - Ownership and understanding of NOTAMs issued by the US NOTAM office.
  - Not having a central authority charged with ensuring that all issued NOTAM messages meet a standard set of criteria
  - NOTAM data differs significantly from the ICAO standard and from region to region
  - Inconsistent and incomplete static data between civil and military data sources cause varying interpretations
  - FAA's procedure to move NOTAM messages that extend longer then 30 days to the NOTAM publication or AFD
  - The lack of Local, GPS, WAAS, NTAP, En route and International NOTAM messages and real time airfield condition reports
  - Information not being available in a timely manner to the international air carriers in Europe
  - Managing the flow of aeronautical information

Do you have an in-house dispatch support function? What is the number of full-time and/or part-time employees dedicated to this activity?

- Number of personnel ranging from a low of 1 to a high of 100+. Average was between 10 and 40 individuals for most air carriers
- Many air carriers mentioned that their staff had other duties or responsibilities so that an exact number was very difficult to calculate

Do you contract this function out through a vendor? If yes, what are the main reasons for not providing this service in-house?

- Most of the domestic and international air carriers have in-house dispatch support function internal to their operations and do not contract this function to an external vendor.
- One domestic and several international air carrier stated that use an outside vendor to translate and process NOTAM data into an improved and highly effective product for their flight operations.
- Several domestic air carriers mentioned that they do purchase International aeronautical data

If you could select one major deficiency and/or problem that the FAA should focus on resolving sooner than later, what would that be?

- **Some suggestions include:**
  - An increase in data accuracy, more timely processing, and the delivery of aeronautical data will improve the quality of flight operation decisions and effectively mitigate risks
  - A “Google-like” search function that will allow global NOTAM data base filtering
  - A single source and point of contact for NOTAM issuance and support, instead of having to call every single center (i.e., on a wild goose chase) to see who issued it and why
  - Stop the practice of removing Class 1 NOTAMS from the system after 30 days, as it is not operationally sound
  - Make high-speed Taxiway closures and Taxiway Lead-off light information available
  - Stop distinction between local/international NOTAM messages

Recommendations

- Implement ICAO formats.
- Provide Local NOTAM information to all air carriers in both graphical and text formats.
- Use standard terms and acronyms as identified by ICAO.
- Provide NOTAM and weather information as soon as possible.
- Be pro-active verses reactive.
- Reduce duplication of NOTAM information from multiple sources.
- Simplify NOTAM messages to reduce the amount of information.
- Provide NOTAM information that can be parsed by other systems, i.e. AIXM.

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Modernizing the U.S. NOTAM System

Industry Day

Amy Johns, FAA AIM Systems

Lt Col James Mills, Chief, DOD NOTAMs Division

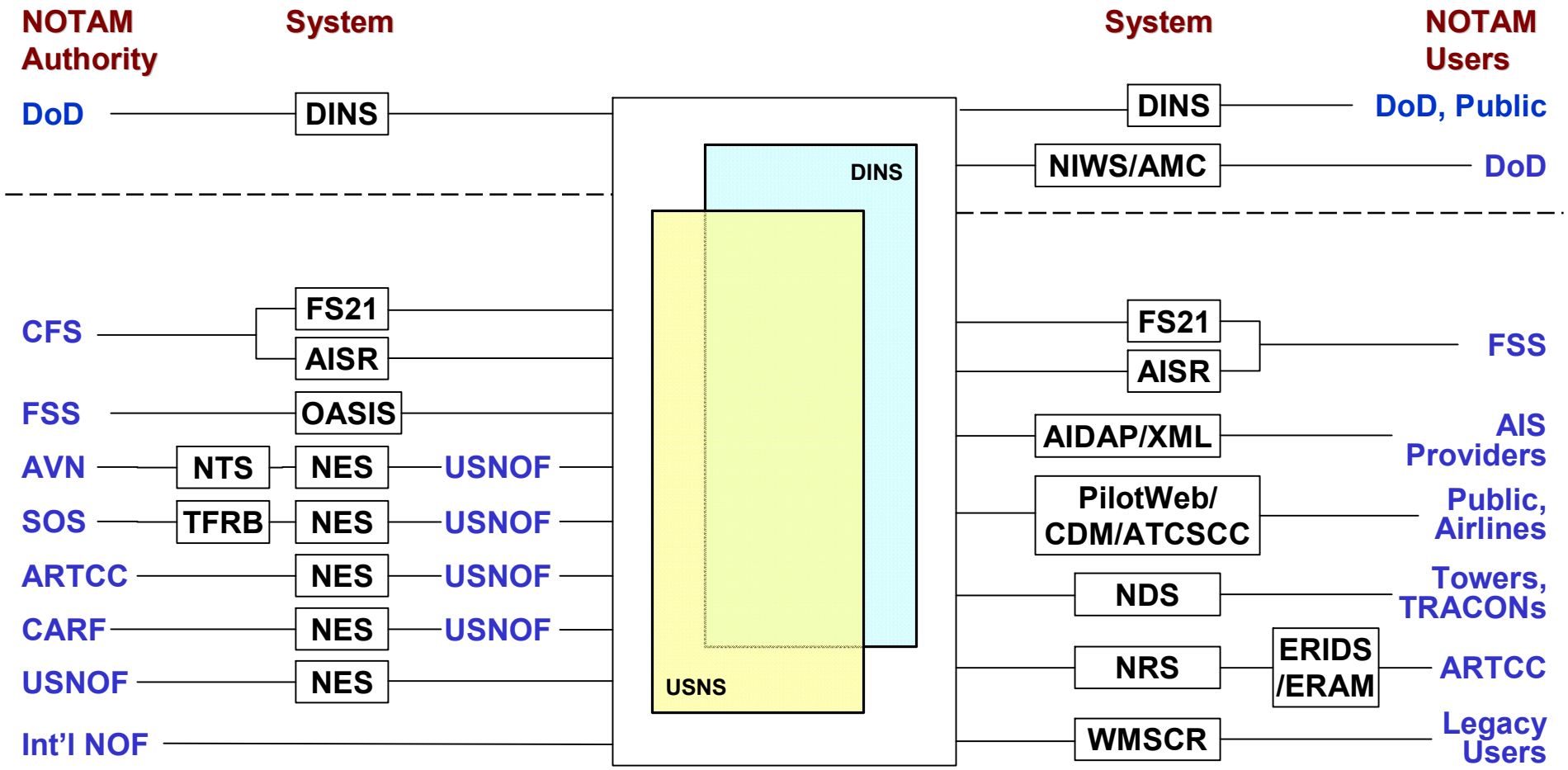
Why Modernize?

- **We must respond to customer concerns**
  - ICAO standardization
  - Local NOTAM accessibility
  - Data reliability, accuracy, and timeliness
  - Digital delivery of data
- **We need to operate more efficiently**
  - Resources are limited
  - Improved service delivery without increase in cost

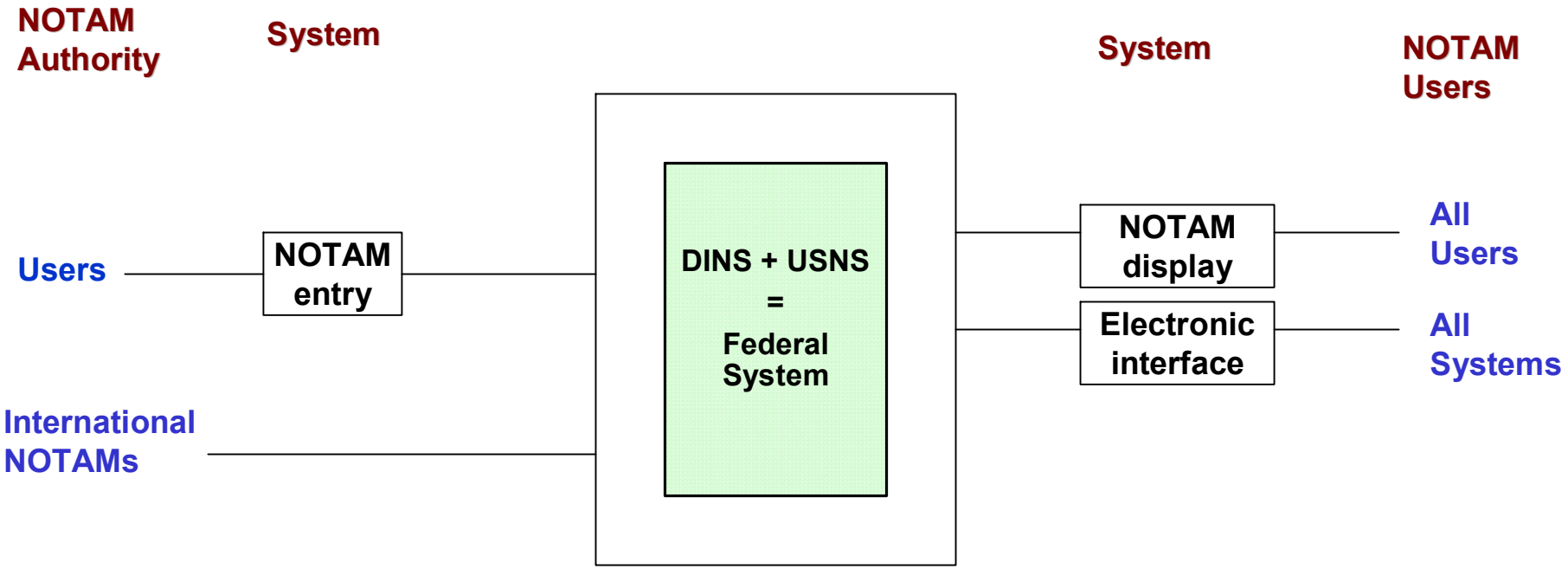
Modernization Goals

- **Improve the quality of NOTAMs**
  - Too much data; not enough meaningful information
  - NOTAMs are difficult to understand
    - Graphical depiction necessary
  - Reliability and accessibility improvements
    - Digital data exchange will enhance filtering and sorting
- **Conform to ICAO standards**
- **Provide a single source for all NOTAMs**
  - Need single collection and distribution point for all information
  - Consolidate inefficient legacy systems for improved customer service
- **Balance diverse customer needs**
  - General Aviation, Airlines, Military, ATC, International

Today's NOTAM Environment



Future Vision



Federal System

- **Merge civil and military systems**
  - DINS + USNS = One Federal System
  - Single NOTAM repository and distribution source
  - Continue to support all users without disruption

- **Full ICAO implementation**
  - Take advantage of ICAO format for advanced filtering and international standardization

Roadmap

Activity	Date	Result
Announcement	May ’07	Commitment by U.S. Government to Modify NOTAM System
Initial Policy Change	Oct ‘07	GENOT: Align D NOTAM criteria with ICAO NOTAM criteria (eliminate L NOTAMs)
System and Policy Changes	2009	One Federal System with Full ICAO Implementation
System Enhancements	2010+	Digital (AIXM) & Graphical Capabilities

Initial Policy Change

- **Expand definition of a Distant (D) NOTAM**
  - Adopt ICAO definition for aerodrome movement area
    - Will now include taxiways and lighting
  - Today's Local NOTAMs eliminated

- **Tag information NOTAMs that are not ICAO compliant**
  - Other information that may impact aircraft operations will be tagged with (O)
  - Reduce information overload on customers

NOTAM D Examples

Today

- **Runway condition**
  - !MIV 05/123 MIV RWY 10/28 CLSD 0709021200-0709021600

Future (previously local NOTAMs)

- **Taxiway status**
  - !RDU 05/123 RDU TWY A CLSD BTWN A1, A2 TIL 0709011600
- **Ramp/Apron status**
  - !MEM 05/123 MEM RAMP PAEW FEDEX CARGO EAST
- **Lighting status**
  - !PIE 05/123 PIE TWY A CL LGTS OTS
- **Other status information**
  - !LOU 05/123 LOZ (O) CONTROLLED BURN ON NORTH SIDE OF FIELD TIL 0708302200

Initial Implementation Activities

- **Conduct safety assessment**
  - Internal and external stakeholders
- **Continue to assess NOTAM data**
- **Perform stakeholder training/familiarization**
  - Originators, processors and users of NOTAM data
    - Military and civilian
- **Issue GENOT effective October 1, 2007**
  - Policy changes frozen by August 1, 2007

Initial Planned Improvements

- **Complete repository of U.S. NOTAMs from single source**
- **Increase in D NOTAMs; No more L NOTAMs**
  - Currently avg ~33,000 D NOTAMs/month
  - Expect avg ~4,000 new D NOTAMs/month
    - No more than 20% expected to be Other type (O)
- **International cross-over NOTAMs will also include taxiway and ramp/apron NOTAMs**
- **Standard terminology for text field**
  - !PIE 05/123 PIE **TWY** A CL LGTS OTS

Summary

- **Align NOTAM D to ICAO definition**
- **Apply quality and safety management processes**
  - National repository for all NOTAMs
  - Standardize data formats
  - Move towards centralized NOTAM entry
- **Single federal NOTAM system**
  - Full ICAO compliance
- **Digital NOTAM exchange**
  - Data entry and distribution
  - Machine readable

Aeronautical Information Management

Federal Aviation Administration

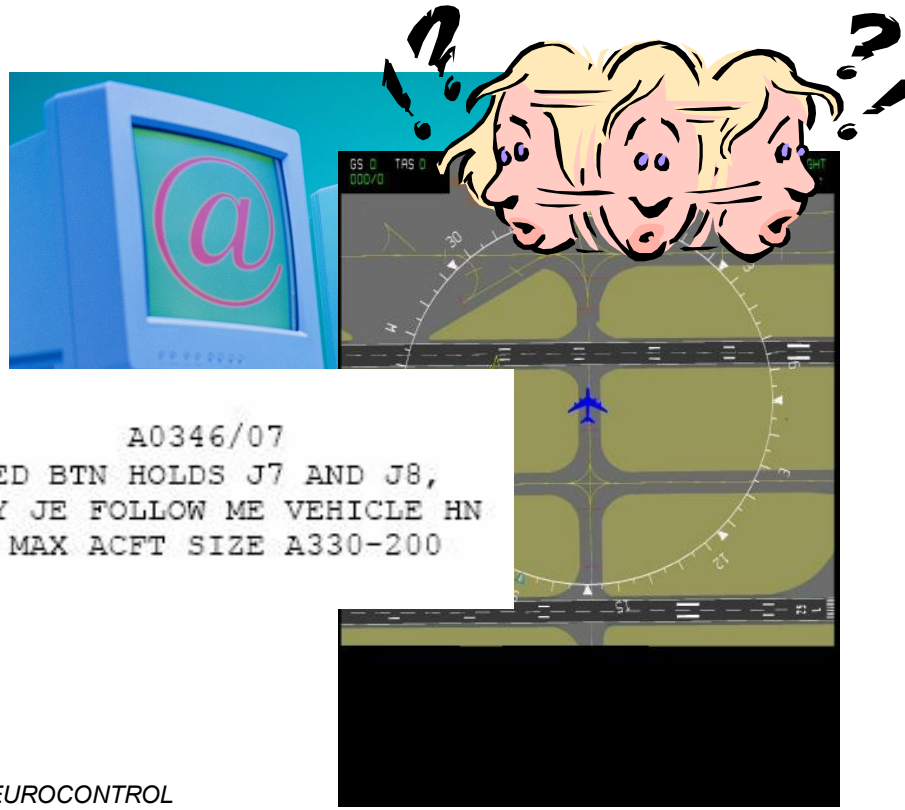
The Future: Digital NOTAMs

Industry Day

Gary Bobik, AIM Planning and Architecture

Why digital NOTAM?

- **Safety and Capacity**
  - Next Generation ATS (NexGen)
    - Shared situational awareness
  - Current situation
    - NOTAM overwrite database
    - Dynamic data over static data



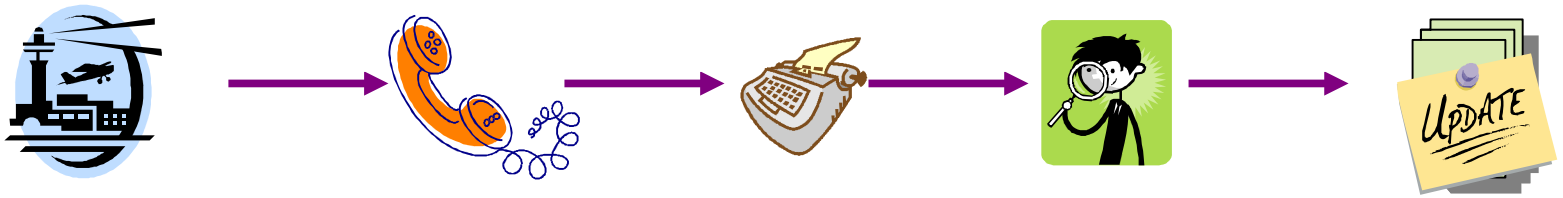
```
Q)EGTT/QMXLC/IV/M/A/000/999/5321N00216W005
FROM 07/02/07 01:41 TO 07/05/04 17:00                    A0346/07
E)DUE WIP TWY F CLOSED AT HOLD F3, TWY J CLOSED BTN HOLDS J7 AND J8,
  TEMPO UNLIT DIVERTED TWY BTN HOLD J8 AND TWY JE FOLLOW ME VEHICLE HN
  AND LVP. STANDS 15 AND SB1 CLOSED, STAND 44 MAX ACFT SIZE A330-200
```

- **Digital NOTAM can help**

Adapted from xNOTAM briefing given at 2007 AIXM User Conference by Eduard Porosnicu, EUROCONTROL

Airport NOTAMs today

2/20 CLSD WINGSPAN OVR 60 EXC 4 HR PPR 615-350-5000



EVENT
NOTAM trigger (e.g., Runway damage)

ORIGINATOR
"Airport Authority"
Phone or Fax to FSS

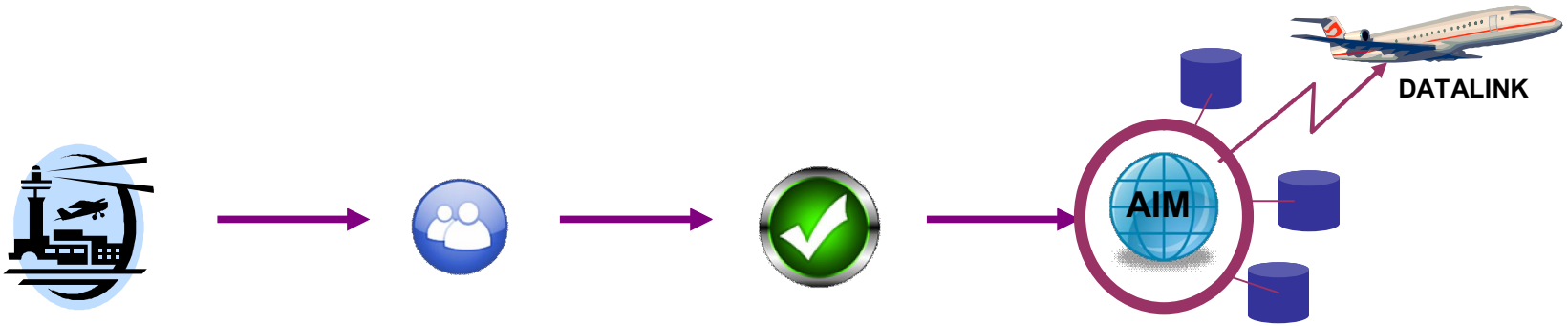
FSS
Entry

VALIDATION
NOTAM Office

CUSTOMER
Phone or Fax to FSS

- **Phone call or fax**
- **Multiple manual interventions**
- **US Distant NOTAMs "D" NOTAMs**
  - Suitable for Runways and Obstacles
- **US Local NOTAMs "L" NOTAMs**
  - Suitable for Taxiways, lighting, other informational messages
  - Doesn't meet safety criteria
  - Not distributed internationally
- **Legacy System Limited**
  - Safety
  - Non-Safety

Testing a Concept of Operations – Overview



Originate NOTAMs at the Source

Ensures Data integrity
Ensures Traceability
Allows digital encoding

Validate and Publish by FAA

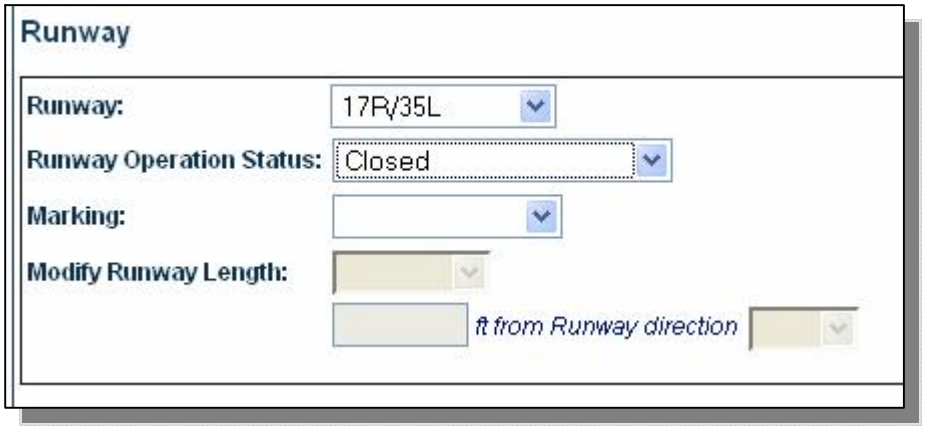
Integrates permanent and temporary information
Computer readable
Allows electronic distribution to customers

Concept of Operations

PROTO-NOTAM Origination

EVENT
NOTAM trigger (e.g., Runway damage)

AUTHOR
Airport Authority



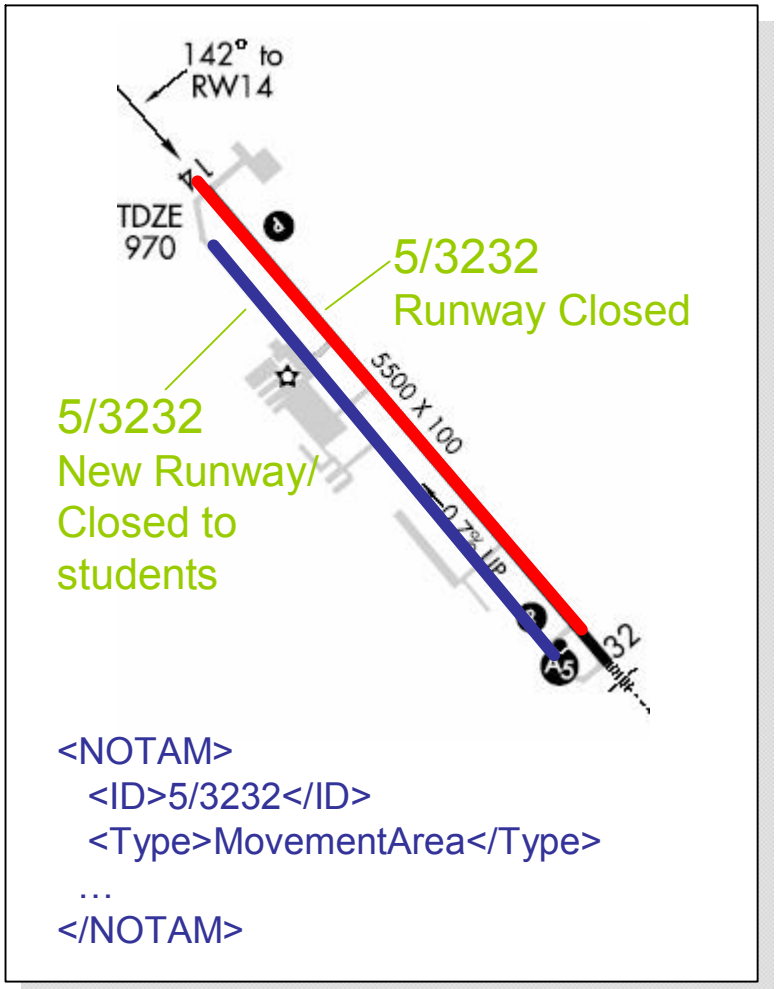
Originate ProtoNOTAMs at the Source

Data integrity
Traceability
Encode digitally

- **Minimize free form text**
- **Pre-populated data entry screens**
- **Based on NASR data base**
- **Quality assurance at the source**
- **Enables direct submission to FAA without manual intervention**

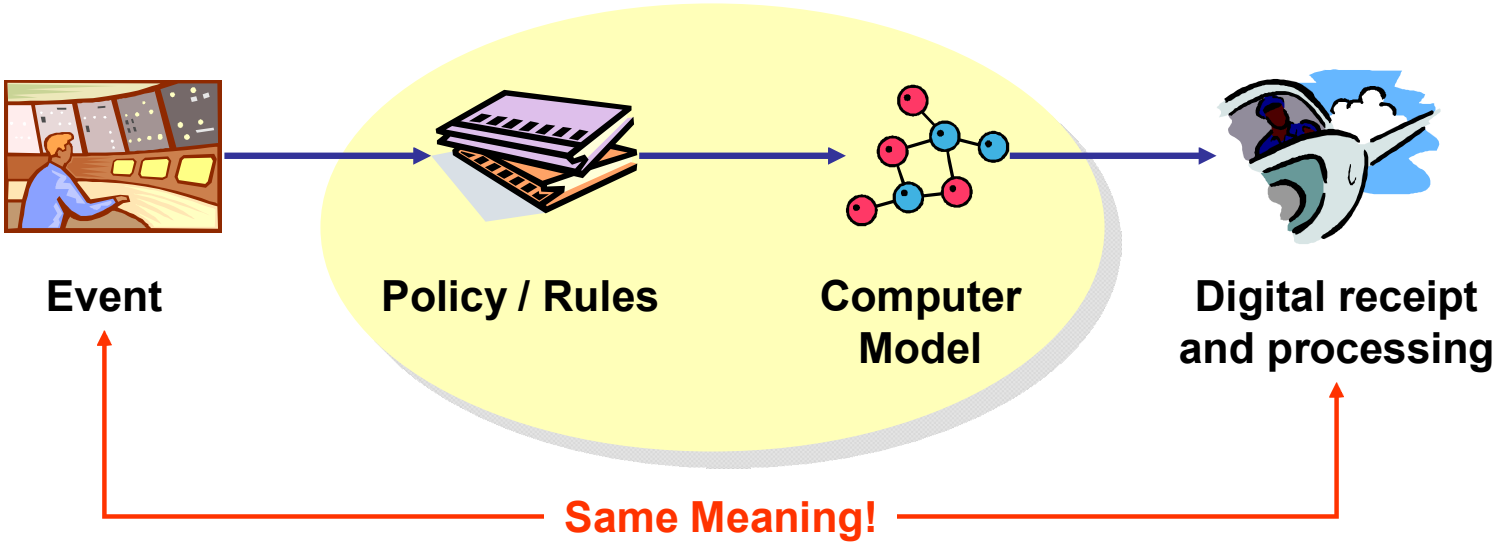
Characteristics of digital NOTAMs

- **Geo-referenced**
  - NOTAM can be located on a map
- **Temporal**
  - Machine interpretable schedule
  - Machine interpretable period of effectivity
- **Linked to static (published) data**
  - Fuses machine interpretable references to published aeronautical data
- **Transformable**
  - The ability to represent a NOTAM as a graphic (map) or text outputs
- **Query enabled**
  - Computer can reliably filter data based on user criteria (e.g., location/time)
- **Electronic distribution ready**
  - Ability to distribute electronically (e.g., AIXM XML, partnership with Eurocontrol)




```
<NOTAM>
  <ID>5/3232</ID>
  <Type>MovementArea</Type>
  …
</NOTAM>
```

Challenge
Encoding digitally



Develop business rules for encoding all the different types of events to ensure that a NOTAM is..

1. **Clear – no ambiguity**
2. **Operationally focused**
3. **Consistently encoded**

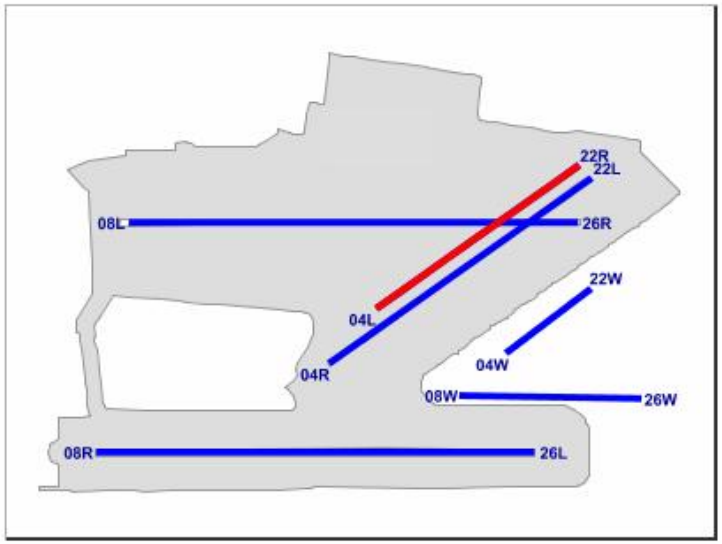
Conceptual Views

!HNL 10/051 HNL RWY 4L/22R CLSD 0400-1600 DLY WEF 0612180400-0612201600

Plain Language NOTAM

Description	
NOTAM Number	10/051
Issue Date	16 Dec 2006 09:00:00 UTC
Airport	HNL (PHNL) Honolulu International
Effective Times	
Beginning	18 Dec 2006 04:00:00 UTC
Ending	20 Dec 2006 16:00:00 UTC
Affected Area(s)	
Runway	04L/22R
Operation Status	Closed
Affected Hours	Start Time 04:00:00 UTC - End Time 16:00:00 UTC
Issuing Authority	Honolulu International

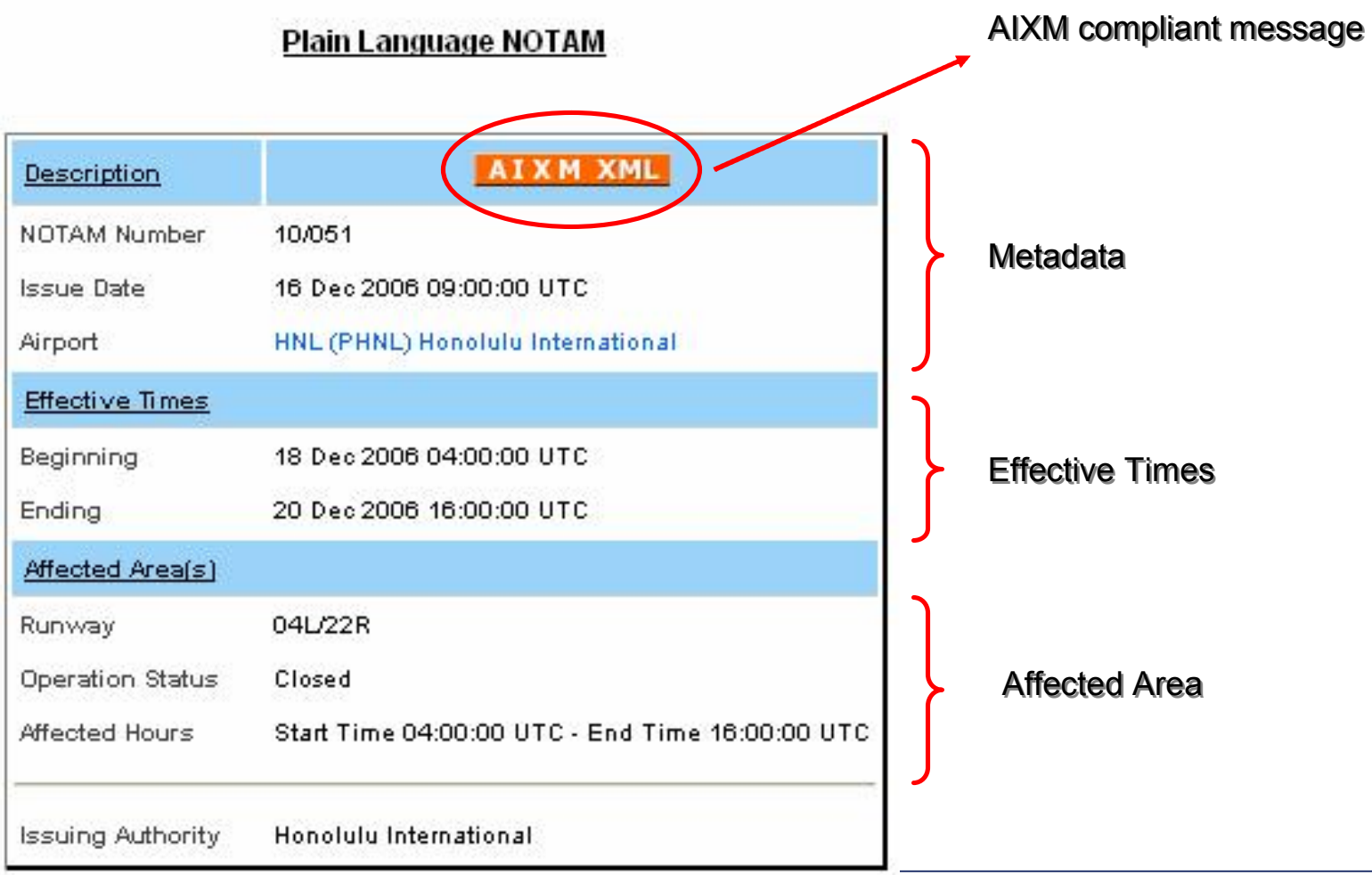
Airport Layout



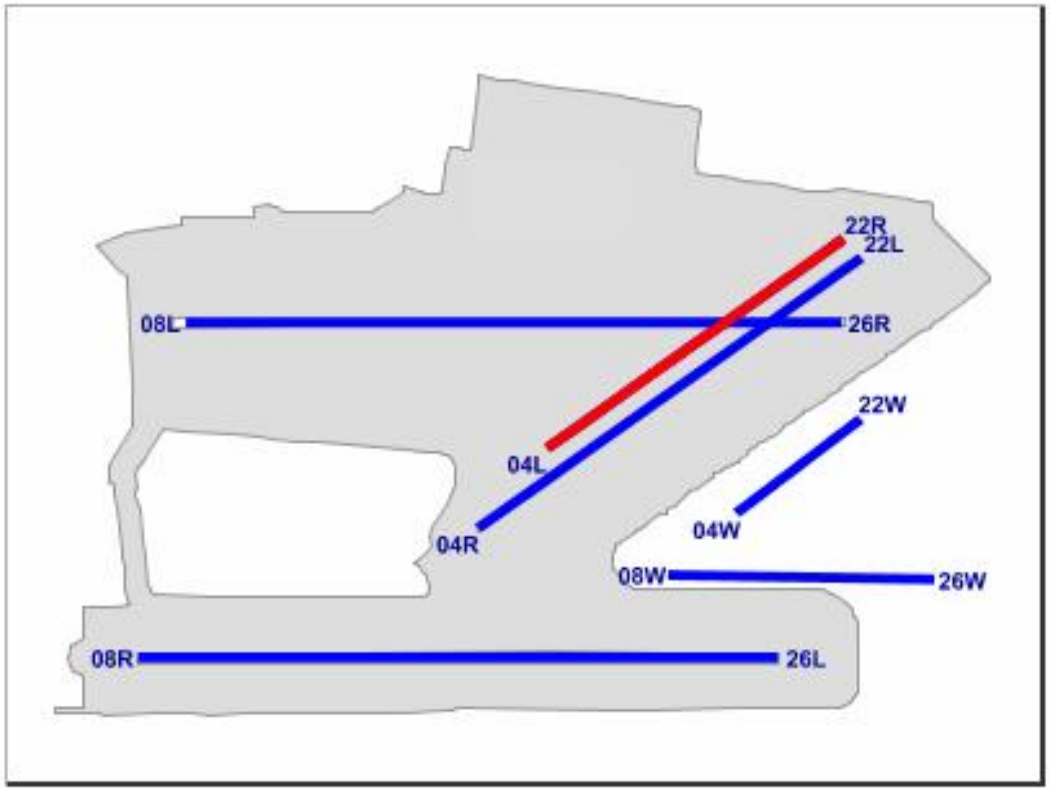
Plain Language Text

Graphical Output

Sample Prototype –
Text Output



Sample Prototype
Graphical Output



Honolulu International Airport Layout

NOTAM affected Runway RWY (04L/22R) in RED

Example – Plain text and graphical

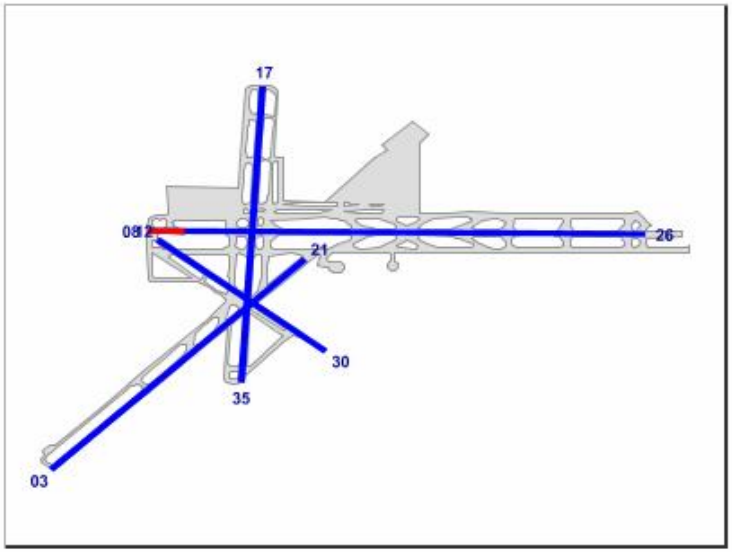
!ABQ 10/024 ABQ RWY 8/26 W 1000 CLSD

Plain Language NOTAM

Description	AIXM XML
NOTAM Number	10/024
Issue Date	3 Oct 2006 11:00:00 UTC
Airport	ABQ (KABQ) Albuquerque International Sunport
Effective Times	
Beginning	Effective immediately
Ending	Until further notice
Affected Area(s)	
Runway	08/26
Operation Status	Open with Restriction(s)
Length	West 1000 ft closed
Issuing Authority	Albuquerque International Sunport

Plain Language Text

Airport Layout



Graphical Output

Final Thoughts

- **Digital information management is the key to meeting future air traffic system goals**
  - A clear “Chain of Custody”
  - We can transform data into information usable by customers and computer systems
- **Digital Airport NOTAM**
  - Enable digital entry at the source
  - Improve NOTAM management with the customers

Aeronautical Information Management

Federal Aviation Administration

Questions

Industry Day

Barry C Davis, Aeronautical Information Management Group

Questions?

- **Why now?**
- **How many new NOTAMs will users see?**
  - What is the effect of adding legacy Ls?
- **What's next?**
- **How will users find out what is going on?**

Why now?

- **Challenge : Think Local – Go Global**
  - Think Local
    - Familiar
    - Ease of Use
  - Go Global
    - Common Formats
- **What's different**
  - As text message – Conflicting formats
  - As digital data – 2 Views of the same data

How many new NOTAMs will users see?

April 2007

Statistical Sample	Legacy
33,000	D NOTAMs
4,000	L NOTAMs
======	
12%	More

What's next?

Activity	Date	Result
Announcement	May '07	Commitment by U.S. Government to Modify NOTAM System
Initial Policy Change	Oct '07	GENOT: Align D NOTAM criteria with ICAO NOTAM criteria (eliminate L NOTAMs)

- Safety Analysis
- GENOT
- Labor Relations Briefings
- Training

How will users find out what's going on?

Recommendation 3 – Establish and Execute a Communications Strategy – let the aviation community know about current products and plans for the future

Source: Booze Allen AVA Survey

- **NFDC.FAA.gov/aimnews**
- **We will also add the ability for users to give us feedback**
  - Service
  - Quality

Thank You for your support!