Airport Direct-entry Digital NOTAMs

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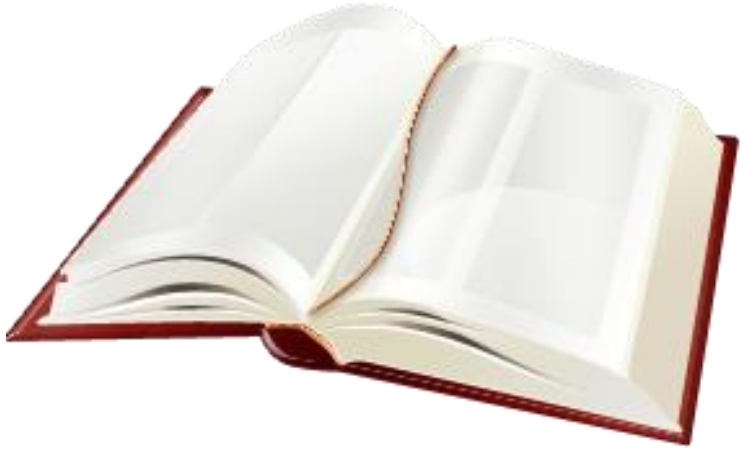
Ingredients for any story:

- *Who*
- *What*
- *Where*
- *When*
- *How,* **and**
- *Why*



Start with *Why*

- **Denver International Airport:**
  - 3 months from 15 Feb to 16 April – it took an **average of 8 minutes** from request for NOTAM to actual publication of NOTAM in US NOTAM system. Times varied from **2 minutes to 27 minutes**.
- **All of United States:**
  - First 5 months of 2009 – **2.7% of NOTAMs were rejected** by USNS, and
  - **38% of NOTAMs were edited**.

Goals of Digital NOTAMs

- **Improve safety by reducing errors and improving timeliness**
  - Improve accuracy
  - Digital NOTAMs removes most human errors
  - Improve efficiency by improving timeliness
- **If originators are responsible for the accuracy of their NOTAMs – shouldn't they have control of their NOTAMs?**
- **Support NextGen**

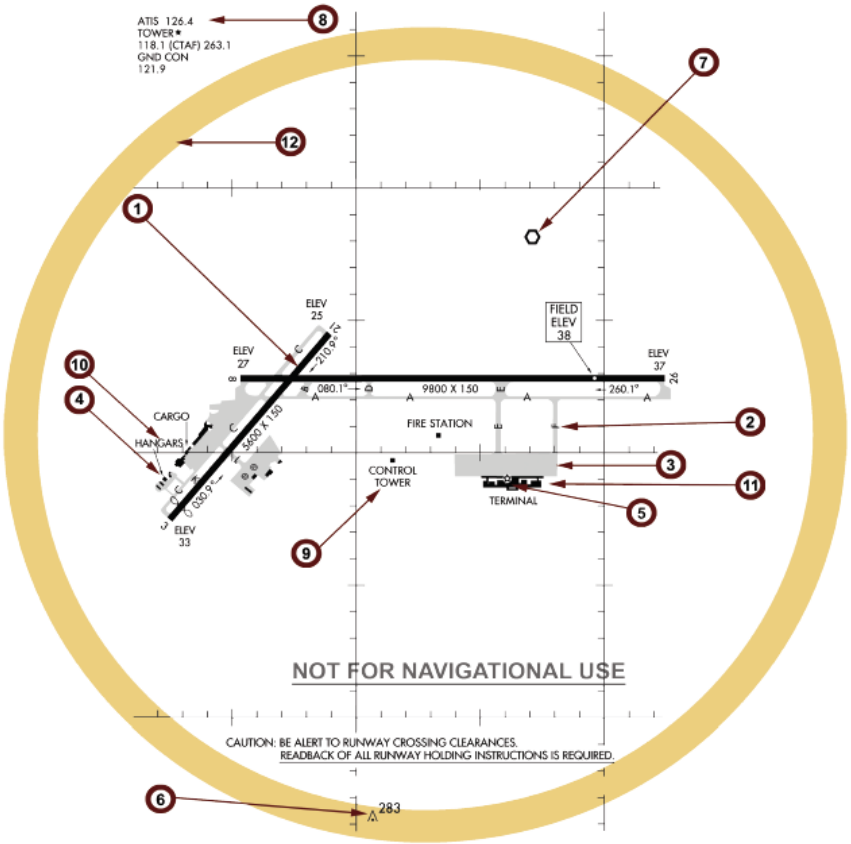
Who participates in the test?

- **Originators of NOTAMs include: Airports, Military, Facilities, Procedures, Forest Service, Obstruction lights…**

- **For this TEST we selected Airports (In US airports are responsible for 7 types NOTAMs: aerodrome, runway, taxiway, apron, ramp, service & obstruction (cranes on the airport)**

Monday – 28 January 2008 0500 UTC

The "D" NOTAM



Keywords		NOTAM Examples
RWY	1	**RWY 3/21 CLSD** Runways 3 and 21 are closed to aircraft.
TWY	2	**TWY F LGTS OTS** Taxiway F lights are out of service.
RAMP	3	**RAMP TERMINAL EAST SIDE CONSTRUCTION** The ramp in front of the east side of the terminal has ongoing construction.
APRON	4	**APRON SW TWY C NEAR HANGARS CLSD** The apron near the southwest taxiway C in front of the hangars is closed.
AD	5	**AD ABN OTS** Aerodrome's airport beacon is out of service
OBST	6	**OBST TOWER 283 (246 AGL) 2.2 S LGTS OTS (ASR 1065881) TIL 0707272300** Obstruction. The lights are out of service on a tower that is 283 feet above mean sea level (MSL) or 246 feet above ground level (AGL) 2.2 statute miles south of the field. The FCC antenna structure registration (ASR) number is 1065881. The lights will be returned to service 2300 UTC (Coordinated Universal Time) on July 27, 2007.
NAV	7	**NAV VOR OTS** Navigation. The VOR located on this airport is out of service.
COM	8	**COM ATIS OTS** Communications. The Automatic Terminal Information Service (ATIS) is out of service.
SVC	9	**SVC TWR 1215-0330 MON-FRI/1430-2300 SAT/1600-0100 SUN TIL 0707300100** Service. The control tower has new operating hours, 1215-0330 UTC Monday Thru Friday, 1430-2300 UTC on Saturday, and 1600-0100 UTC on Sunday until 0100 UTC on July 30, 2007.
	10	**SVC FUEL UNAVBL TIL 0707291600** Service. All fuel for this airport is unavailable until July 29, 2007 at 1600 UTC.
	11	**SVC CUSTOMS UNAVBL TIL 0708150800** Service. United States Customs service for this airport will not be available until August 15, 2007 at 0800 UTC.
AIRSPACE	12	**AIRSPACE AIRSHOW ACFT 5000/BLW 5 NMR AIRPORT AVOIDANCE ADZD WEF 0707152000-0707152200** Airspace. There is an airshow being held at this airport with aircraft flying 5000 feet and below within a 5 nautical mile radius. Avoidance is advised from 2000 UTC on July 15, 2007 until 2200 UTC on July 15, 2007.

NOTE: All "D" NOTAMs will have a keyword at the beginning of the text of each NOTAM
Effective: JAN 2008 thru AUG 2008

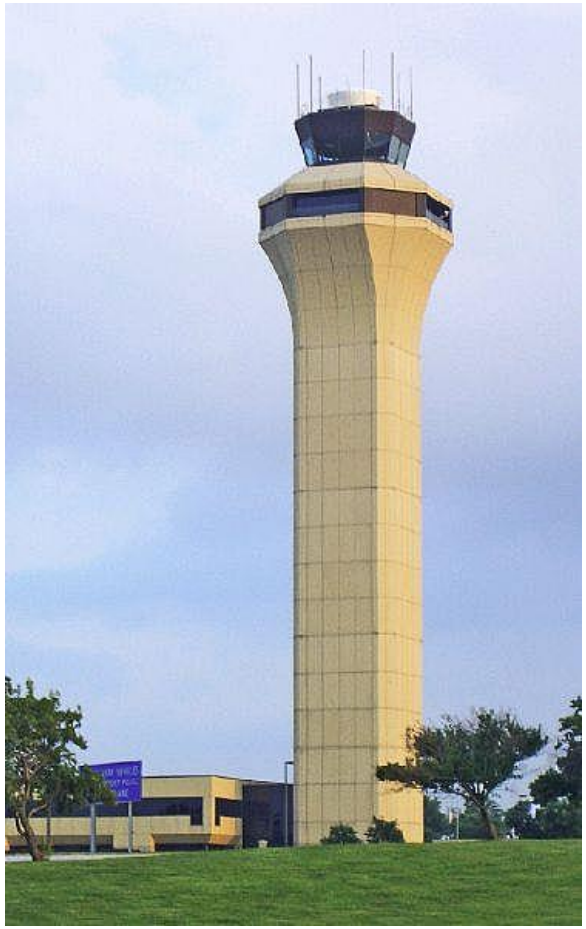
FAA ATO AJR AIM #071207

What will you test?

- **Initially we were only going to test runway NOTAMs at 10 airports.**
- **However problematic to use 2 different NOTAM entry software at the same time: 1 for runways and the other for the rest of the NOTAMs – especially when fatigue becomes a problem during long snow events. ----- so we changed to all 7 types of airport NOTAMs at 10 airports.**

Where will you test?

- **10 airports – which 10?**
  - DEN, IAD, DCA, BWI, MEM, ORD, MDW, ORF, RIC, ACY
- **Consider safety case**
  - Decided to pick airports which all had 24-hour/continuously operating Air Traffic Control Towers – so safety hazards would be most similar.



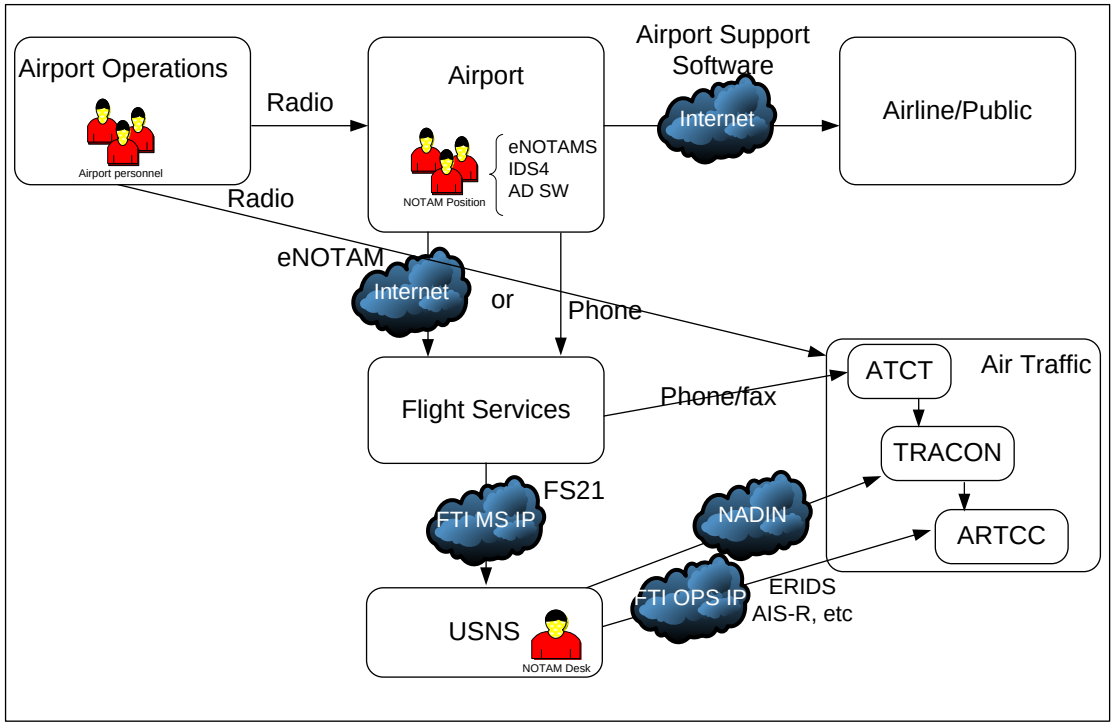
Always start with Safety

- **Prepare Safety case (SRMD) for Direct-entry Digital NOTAMs at Airports with 24-hour Towers**
  - Collect information regarding Legacy system
  - Collect information on Digital NOTAM system

Example: Denver needs to close a RWY for snow removal

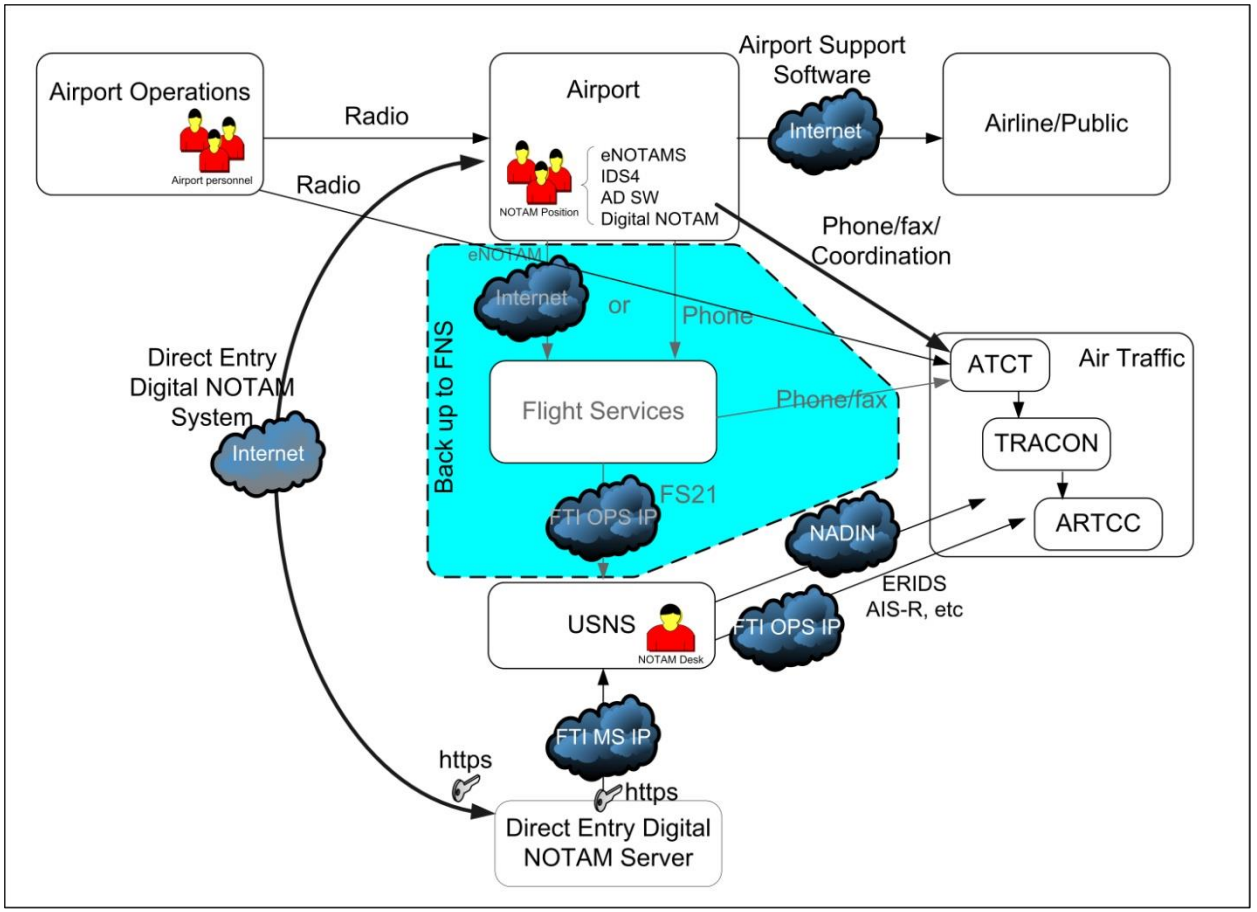
Current Denver NOTAM process

1.



Proposed Denver NOTAM process

2.



Safety case – lessons learned

- **Establish boundaries of safety case**
  - Who are primary stakeholders?
  - Will you be required to do a safety case for each airport or can similar ones be combined – i.e. 24 hour towered airports?
  - How extensive should the safety case be? I.e. Establish requirements for new software – then test based upon requirements and pass test, rather than provide copy of software test plan.

Safety process at FAA

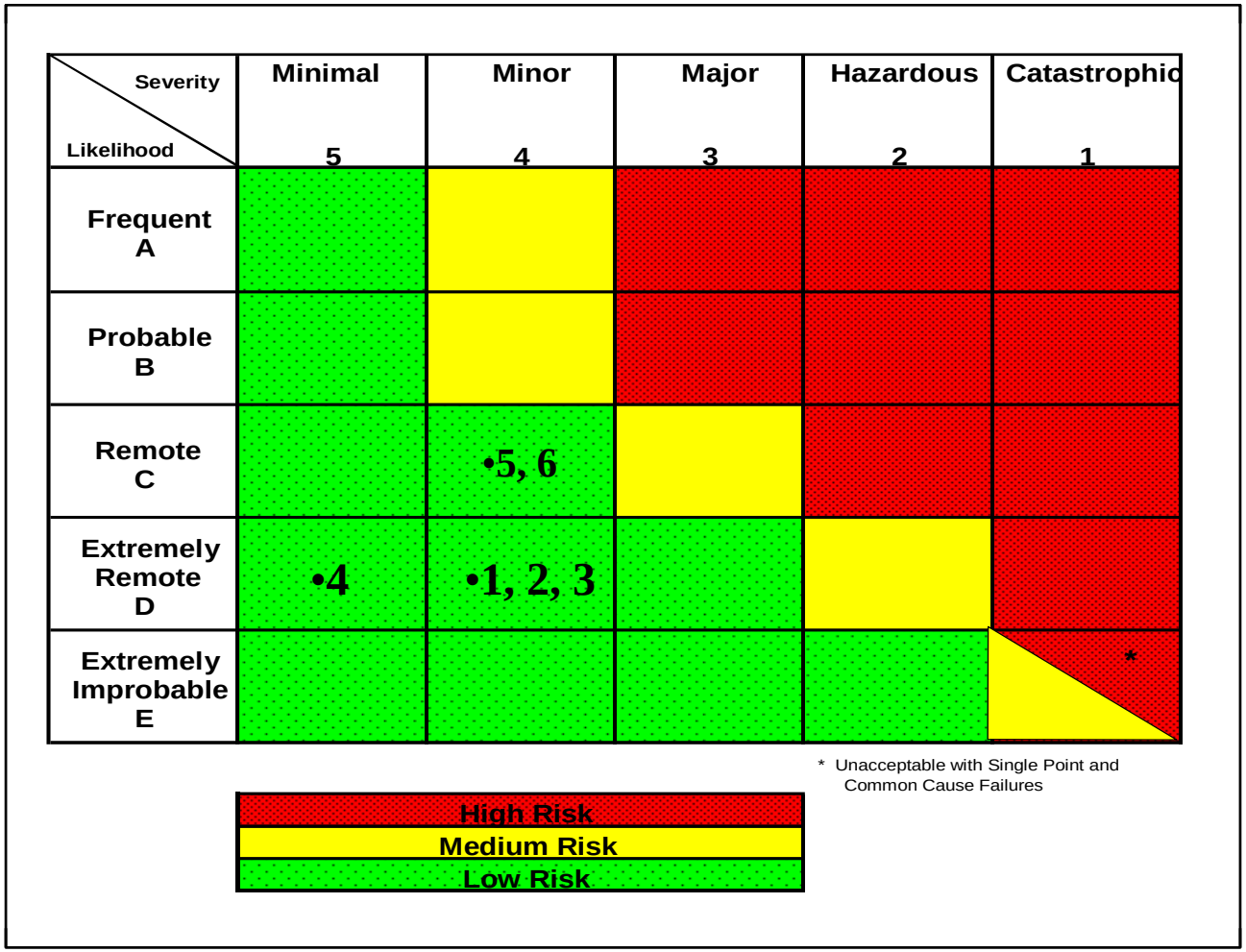
Overall summary:

- **Use experts and “what if” scenarios to determine hazards**
- **List existing controls which mitigate hazard level**
- **Use chart to determine severity level of hazard (minimal, minor, major, hazardous, catastrophic)**
- **Determine likelihood of hazard (frequent, probable, remote, extremely remote, extremely improbable)**
- **Create risk matrix -**

List of 6 Hazards in this case

1. Data corruption due to hackers or unauthorized users accessing the Digital NOTAM system. (human interference)
2. Data corruption due to software/hardware malfunction (machine corruption).
3. Digital NOTAM system unavailable due to network latency, loss of connection, or loss of power.
4. Lack of synchronization of the Digital NOTAM system and the current legacy system used by Flight Service.
5. Data entry error from Airport Ops personnel.
6. Failure of Airport Operation's personnel to notify the "affected ATC facility."

Risk Matrix


Severity
Likelihood
Minimal
5
Minor
4
Major
3
Hazardous
2
Catastrophic
1
Frequent
A
Probable
B
Remote
C
•5, 6
Extremely
Remote
D
•4
•1, 2, 3
Extremely
Improbable
E
*
* Unacceptable with Single Point and
Common Cause Failures
High Risk
Medium Risk
Low Risk

Components of a successful Test:

- **Brief originator & “affected ATC facilities” & offer 1 year test to originator**
- **Evaluate existing NOTAM data flows (“as is”) between airport & ATC facilities**
- **Evaluate impacts of Digital NOTAM**
  - Safety and information flow changes (“to be”)
- **Based upon changes to policy & procedures - develop letters of agreement**
  - Establishing roles and responsibilities
  - Document how process changes from current policy/procedures
- **Offer training and initial hands on support**

Requirements for other 9 airports:

- **Safety Risk Management Decision Memo (SRMDM)**
  - Airport & ATC facilities review original SRMD and agree no added hazards or increase in level of severity or likelihood of hazards
- **Letter of agreement between Airport & ATC facilities documenting change to notification process (Order 7930.2)**
  - Who calls who about which NOTAMs?
- **Memorandum of Agreement between Program Office (AIM) & Airport**
  - Describes roles & responsibilities during 1 year test
- **Review of all Runway, Taxiway, Apron & Ramp designations to make sure they agree with Digital NOTAM software**

After 10 airport test - then what -- for 2010 and beyond?

- **Other 24-hour towered airports.**
- **Other originators (navaids, obstruction towers lights…**
- **Other aerodromes.**
  - Part-time towers
  - Non-towered
  - Heliports
  - Seaplane bases
- **All of the above.**