ATM-Weather Integration Plan

Federal Aviation Administration

Segment Four – Integration of Weather and Air Traffic Decisions

Presented to: Friends/Partners in Aviation Weather

By: Dave Pace

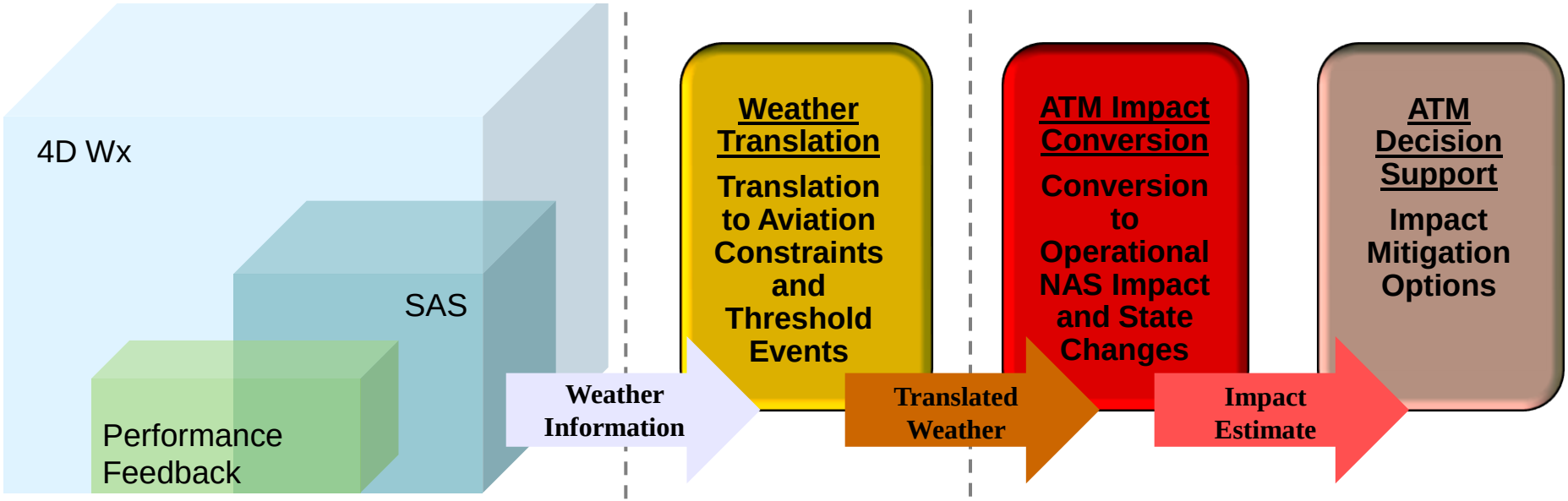
Date: October 21, 2010

Integration Plan Changes

- **Version 1.0 published Sep 17, 2009**
- **Version 2.0 published[1] Sep 24, 2010, with the following refinements**
  - Translation and integration concept (Chapter 2)
  - Analysis of weather integration opportunities (Chapter 3 and Appendix A)
  - Analysis of technologies for quantifying weather constraints and impacts (Chapter 4 and Appendix B), to be covered by Jimmy Krozel
- **Illustrative scenario by Mark Huberdeau follows**

Note 1: V2.0 at http://tinyurl.com/32gk4v5, 383 pages, 32MB

NextGen Weather Integration Concept and Division of Responsibilities



e.g., Turbulence, Icing, Convection

e.g., Convective Weather Avoidance Model (CWAM)

Weather Avoidance Fields (WAF)

e.g., Capacity of Flow Constrained Area

e.g., Collaborative Trajectory Options Program

Primary: ***NWS*** ***FAA-MET*** ***FAA-ATM***

Rules of engagement

- **Weather community responsible for:**
  - state of the atmosphere
  - translation to generalized aviation constraints
- **ATM community is responsible for:**
  - determining operational impacts on operations
  - decision support systems
- **Weather constraints to be calculated in response to ATM needs**

Weather Integration Opportunities (Chapter 3, Appendix A)

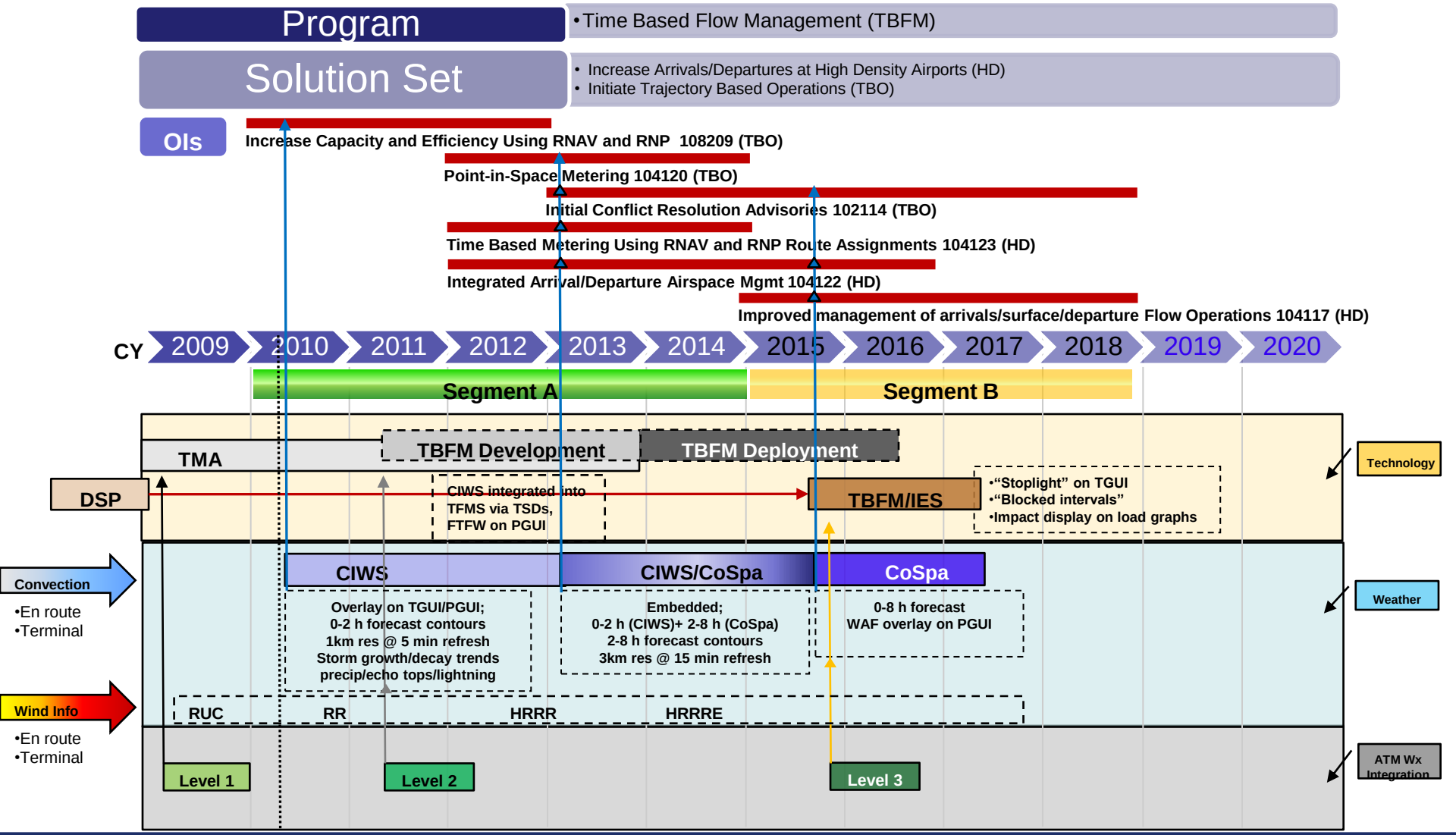
Solution Set-Oriented Analysis

- **Single unified format used for each solution set analysis**
  - Compressed version of the format used in V1.0 for the TBO and Hi Density analyses
  - Fewer pages/analysis ☺
- **Addition of Safety, Security and Environment (SSE) and Facilities (FAC) solution set analyses**
  - Additional pages ☹

Program-Oriented Analysis (New)

- **NextGen weather-related capabilities associated with FAA programs**
- **Analyses of the programs conducted and program/weather integration gaps identified**
- **Graphical representations, based on NAS EA timelines and views, of the programs and related weather activities created**

NAS EA Chart with Weather Insertion Points

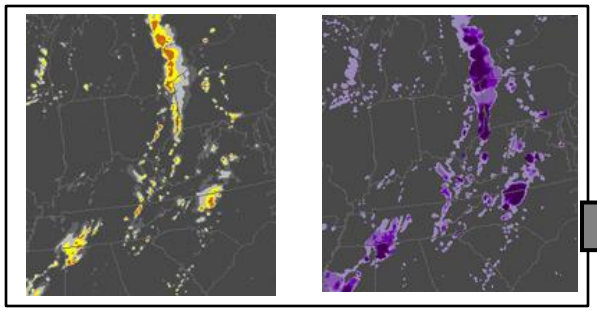


Questions?

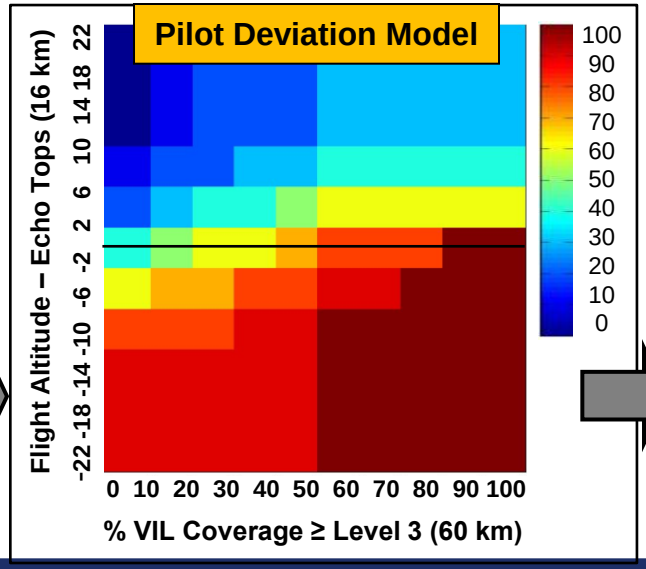
Step 1: Translate weather into constraints

- Knowing the constraint from the convective weather is about predicting pilot decisions
- Will they penetrate the weather, or will they divert around it.
- MIT LL has studied past pilot behavior and has drawn a correlation between storm intensity and storm tops
- Applying the correlation to the weather of the day produces the Weather Avoidance Field (WAF), which is the probability of pilots deviating around a storm

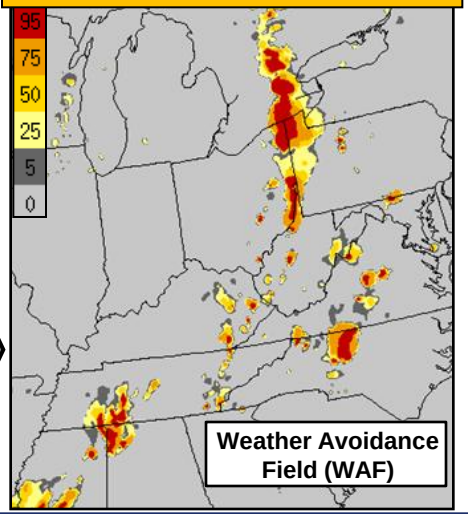
Precipitation & Echo Tops Forecasts



Pilot Deviation Model

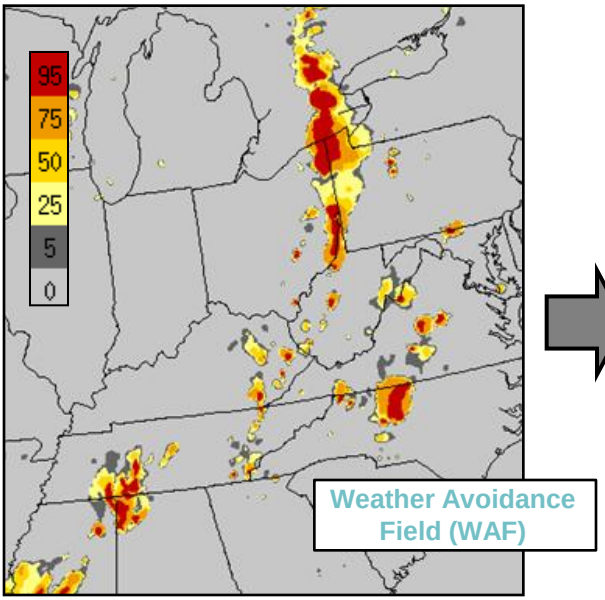


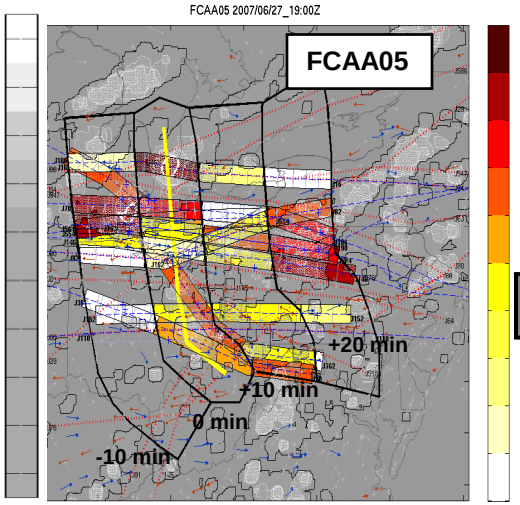
Forecasted Pilot Avoidance Regions



Step 2: From constraints get capacity

- **Apply weather avoidance field (WAF) constraint prediction to corridors across an FCA**
- **Obtain the total capacity across the FCA**





FCA Capacity Forecast Matrix

	11	12	13	14	15	16	17	18	19	20	21	22	23
11	81	96	78	38	72	85	78	68	40				
12		90	78	46	64	88	91	82	39	37			
13			89	57	71	76	88	84	66	28	20		
14				88	85	81	86	89	74	51	17	20	
15					96	88	85	90	70	47	16	19	49
16						90	61	65	68	28	6	13	30
17							77	67	69	63	20	9	17
18								78	61	54	59	19	3
19									50	36	29	33	20
20										0	10	13	16
21											11	5	7
22												6	4
23													6

Predicted Available A05 Capacity
< 75% < 50%