A Concept for Enhanced Bird Threat Information in the ATCT:

WiSC Research Update

Presented to: Bird Strike Conference 2017

By: Mark Hale, CSSI, Inc. (ANG-C54)

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Overview

- **Background**
- **Research Activities Review**
- **Current Research Activities**
- **Summary Research Conclusions**
- **Next Steps**

Background

WiSC Overview

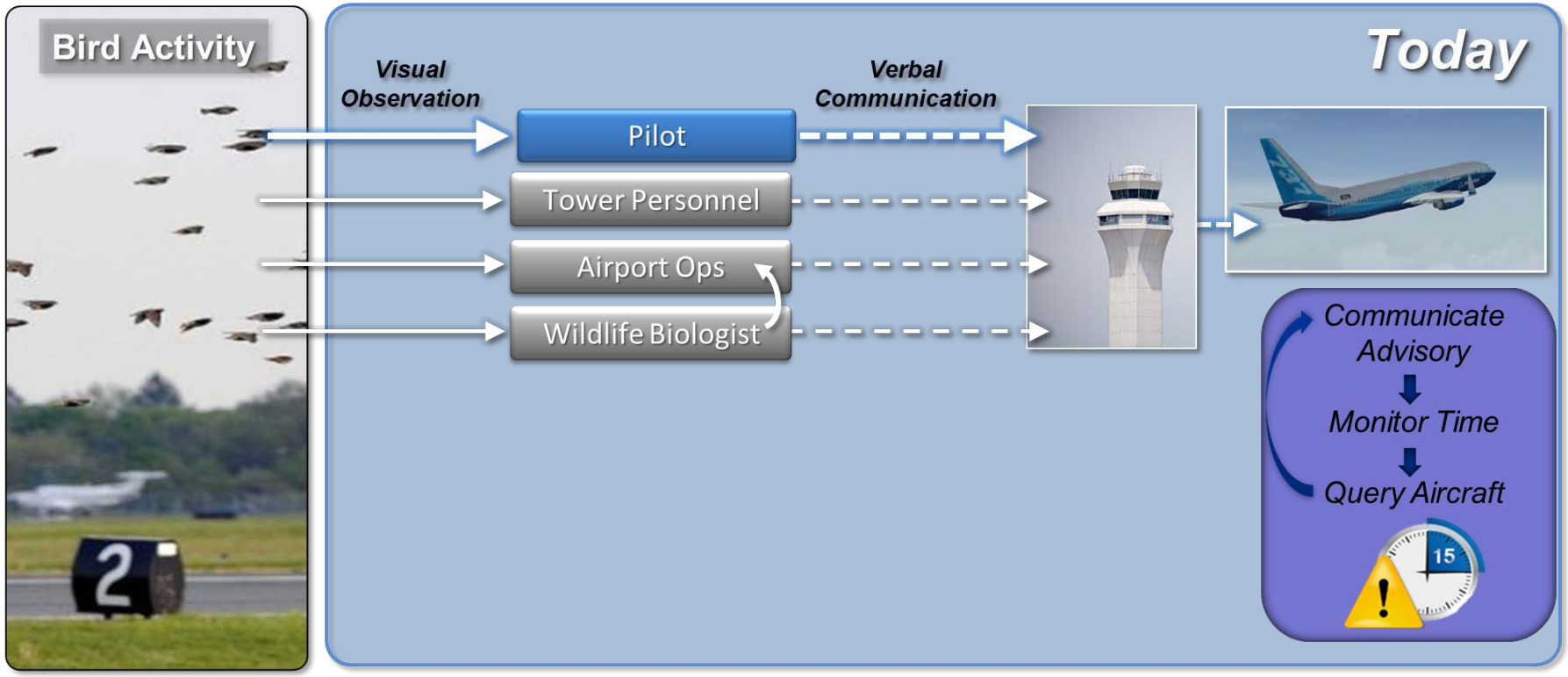
Wildlife Surveillance Concept (WiSC)

- A concept that enables the introduction of more precise bird threat information to the ATCT environment
  - Commercially available radar systems identified in AC 150/5220-25

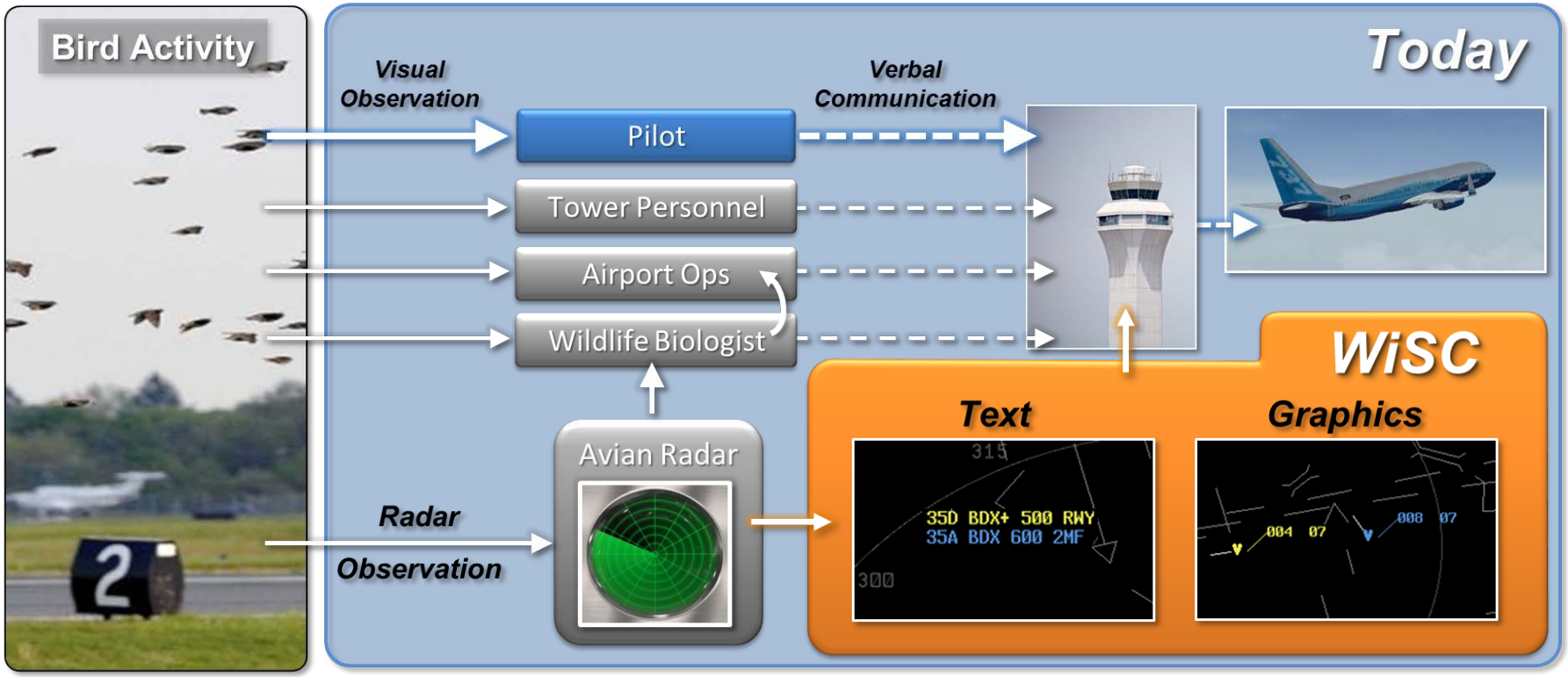
Objectives

- Increase safety by reducing the probability of damaging strikes
  - Improve bird threat detection
  - Improve bird threat information quality passed to the aircraft
  - Improve ATC procedures for disseminating avian threat information

Bird threats today



WiSC Overview



WiSC Overview

- WiSC provides recommendations on how to best present supplemental bird threat information to ATCT users
  - Information Needs
    - Bird threat characteristics (altitude, speed, mass, etc.)
  - Display Requirements
    - Type of display (graphic, text, other)
    - Display system (STARS, IDS, new)
  - Procedural recommendations for disseminating bird threat information
    - Alerting parameters (defining a true “threat”)
    - Dissemination of bird advisories (what and when)

Research Activities

WiSC Research

- WiSC Research Activities
  - Literature Review Database
  - SME Panel
  - Site Visits

  Phase 1

  - Technical Interchange Meeting
  - Shortfall Analysis
  - Laboratory HITL Demonstration

  Phase 2

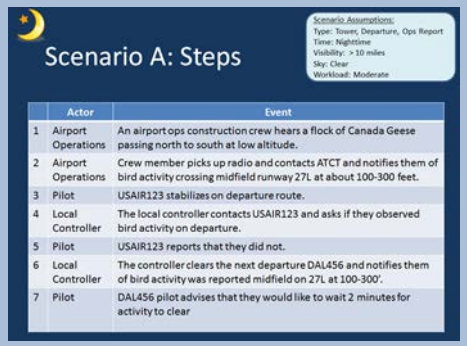
  - FAA Concept Review
  - Concept Socialization
  - Site Validation Activity

  Phase 3

Subject Matter Expert Panel

- **Controllers, Supervisors, & Airline Pilots (2 each)**
  - Scenario walkthroughs (5)
  - Reviewed notional interfaces (graphical, textual)
  - Rated avian threats, value of supplemental bird threat information
- **Key focus areas were identified**
  - System accuracy, ATC system options, Information Display and Interface Design Options, Procedural and Workload Considerations

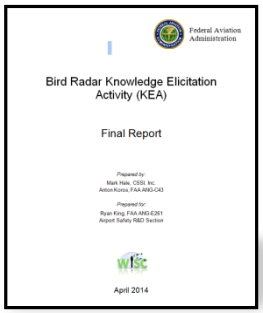
Scenarios


Scenario A: Steps

Scenario Assumptions:
Type: Tower, Departure, Ops Report
Time: Nighttime
Visibility: > 10 miles
Sky: Clear
Workload: Moderate

	Actor	Event
1	Airport Operations	An airport ops construction crew hears a flock of Canada Geese passing north to south at low altitude.
2	Airport Operations	Crew member picks up radio and contacts ATCT and notifies them of bird activity crossing midfield runway 27L at about 100-300 feet.
3	Pilot	USAIR123 stabilizes on departure route.
4	Local Controller	The local controller contacts USAIR123 and asks if they observed bird activity on departure.
5	Pilot	USAIR123 reports that they did not.
6	Local Controller	The controller clears the next departure DAL456 and notifies them of bird activity was reported midfield on 27L at 100-300'.
7	Pilot	DAL456 pilot advises that they would like to wait 2 minutes for activity to clear

Final Report


Federal Aviation Administration

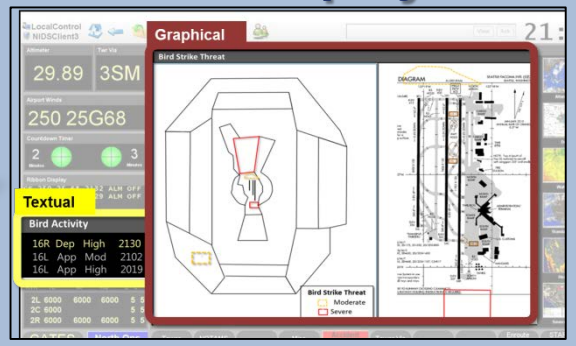
Bird Radar Knowledge Elicitation Activity (KEA)

Final Report

April 2014

Feb 2014

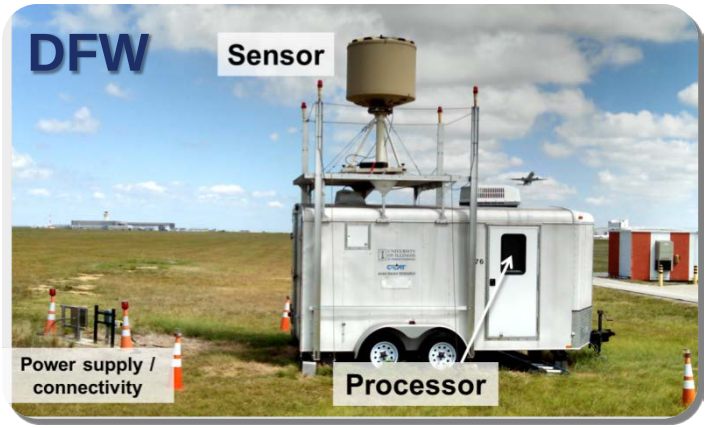
Notional Displays



Site Visits

- Met with airport operations personnel, supervisors, & controllers
  - Controllers currently learn of avian threats primarily via pilot reports
  - Coordination between ATC and airport operations personnel is limited
- ATC & mgmt. responded favorably to having more precise bird threat information
- No consensus on information display preferences

Aug/Sep 2014



Human-in-the-Loop Lab Demo

Tower Simulator (Human Factors Laboratory)

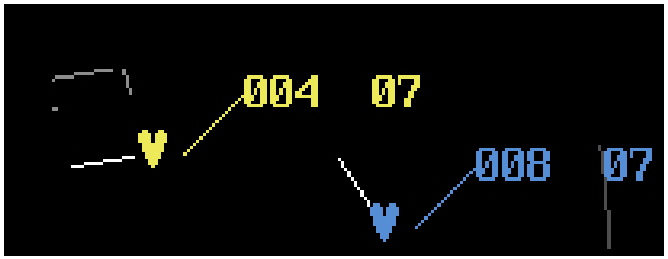
- 270-degree OTW virtual ATCT
- 5 controllers from facilities with known bird strike issues
- Elicited feedback on novel methods of displaying bird threat information to controllers

- Examined measures of preference, workload, situational awareness, and communication across conditions
- FAA technical report published October 2016

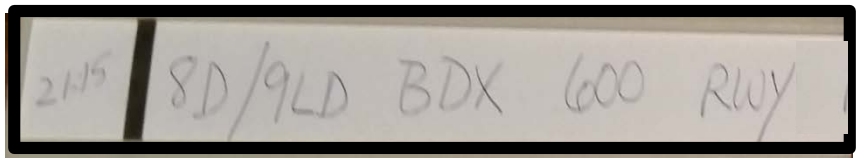
Experimental Conditions

1. **Baseline** – pilot report (PIREP) like today
2. **Text**
   - Like Low Level Windshear Alert System (LLWAS)
   - Presented on STARS (upper left)
   - Accompanied by an audible alert

3. **Target**
   - Presented on STARS
   - Filtered radar targets



4. **Supervisor**
   - Presented on paper strips
   - Same information as text condition



Summary Research Conclusions

Summary Research Questions

- **Favorability Conclusions**
  - Do controllers ***want*** enhanced bird threat information in the ATCT?
- **Benefits Conclusions**
  - What are the potential ***benefits*** to ATC/pilots if enhanced bird threat information is implemented?
- **Information Display Conclusions**
  - What are CPC/FLM ***preferences*** for introducing this new information to the ATCT?
  - What ***procedural considerations*** are there in the dissemination of this information?

Favorability & Need

- Cognitive demand associated with bird threat information is a significant issue

- Throughout our research activities controllers and ATC supervisor participants have:
  - been overwhelmingly in favor of receiving enhanced bird threat information
  - noted a need for enhanced bird threat information in the ATCT

WiSC Benefits

- **Improved threat detection**
  - Bird threat information is obtained by the controller sooner allowing them to be <u>proactive as opposed to reactive</u>
  - Eliminates the reliance on visual observation/confirmation of birds
  - Allows bird detection during low visibility/night operations
  - Reduces cognitive demand

WiSC Benefits

- **Improved information quality**
  - More precise position and altitude information
  - More accurate size (biomass) and direction of flight information
  - Controllers communicate with only the affected aircraft
  - Pilots are able to make better informed decisions and prepare appropriately

WiSC Benefits

- **Improved procedures**
  - Display only significant avian threats to controller
  - Relieve 15 minute reporting period when possible
  - May reduce bird-related communications over the frequency
  - Reduced workload related to bird threat management

Not Significant

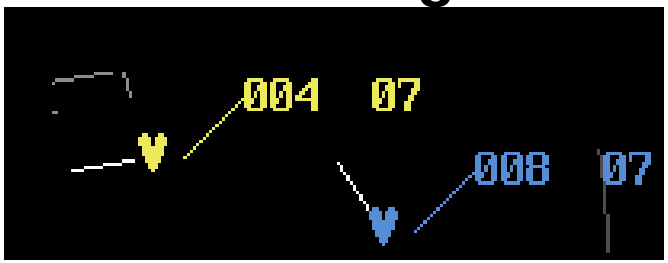
Information Display Preferences

- Prototyped HITL interfaces rated highly
  - slight preference for target over text condition

- Target condition rated most highly in terms of information quality
  - May require slightly more cognitive resources than text condition

WiSC Text

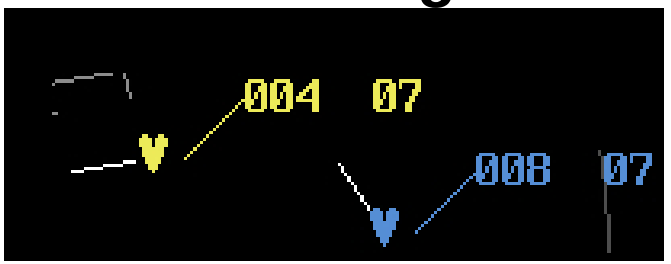
WiSC Target



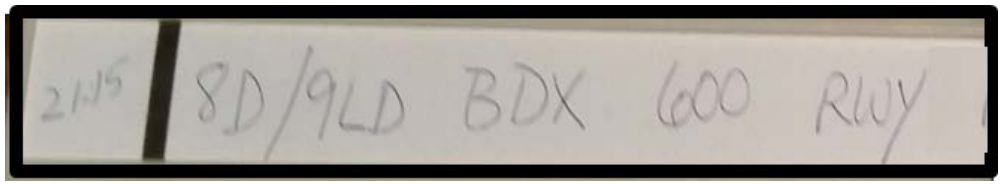
Information Display Preferences

WiSC Text

WiSC Target



- Text condition rated most highly in terms of ease of use
  - Information may be of less value to pilots
- Supervisor condition was deemed unacceptable by participants



Current Research Update

Phase 3 Research Challenges

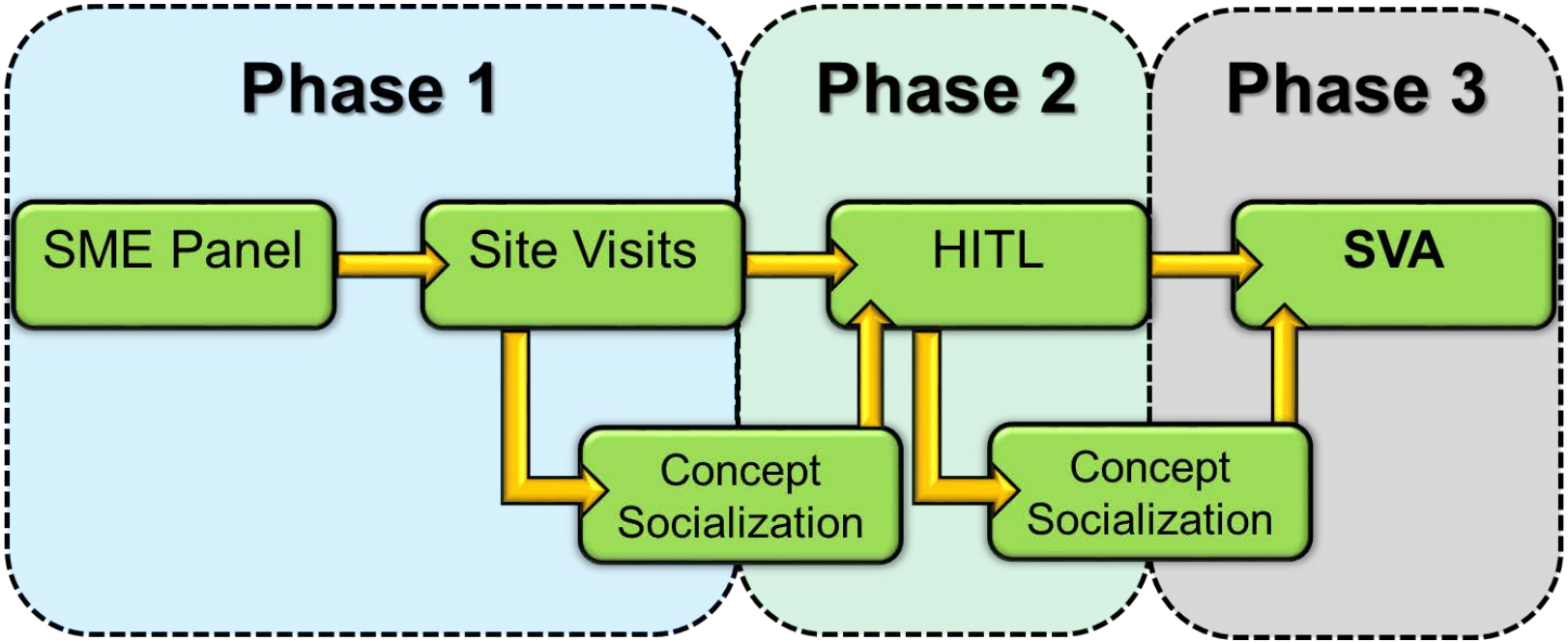
- Phase 3 originally scheduled to follow installation of avian radar at BOS
  - ANG-C54 was to work with ATC towards (partial) integration of radar derived bird threat information

- Revised research plan to focus on Site Validation Activity

Site Validation Activity

Purpose

- Validate information display/procedural findings with NATCA CPCs/FLMs
  - Provides input to Phase 4 Final Concept Work Package



Site Validation Activity

- 5 ATCT facilities requested
  - List of candidate sites includes: SEA, DFW, SLC, DEN, SMF, MEM, ORD, MCI, LGA, MCO, & JFK
  - Targeted $n_{cumulative}$ = 20 participants

Methodology

- One on one, 30-minute structured interviews
  - Heavily based on finding during HITL simulation
- Standardized rating scales evaluating preferred methods for presenting bird threat information to ATCT controllers

Next Steps

Next Steps

Final Concept Work Package

- ATC Benefits Whitepaper
- Final Interface Requirements Whitepaper
- Concept Validation Summary
- Final WiSC ConOps (v3)
- Concept Socialization
    - FAA LOBs as necessary
    - 2018 ICNS papers/presentation
    - BSC 2018

Questions?

Anton Koros

Concept Development & Validation Branch

Advanced Operational Concepts Division

anton.koros@faa.gov

Mark Hale

CSSI, Inc. (Supporting ANG-C54)

Concept Development & Validation Branch

mark.ctr.hale@faa.gov