

NIEC – Total Projects to Date
December 1, 2015

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Projects by Date and Type:

1. TMA Coupled Scheduling (TCS) – October, 2009:
- TMA
2. NKT (Cherry Point, NC) UAS Simulation – December, 2009:
- UAS
3. UAS Achieved Performance – Shadow – December, 2009:
- UAS
4. Staffed NextGen Tower (SNT) 1.0 – February/March/April/May, 2010:
- VAIE (Tower)
5. UAS Achieved Performance – Predator-B – May, 2010:
- UAS
6. NIEC Ribbon Cutting/Opening Day Ceremonies – June, 2010:
- ATM Area (ERAM, STARS), RCS, UAS Area (Shadow), VAIE (Tower)
7. UAS Initial NAS Integration (INI) – May/June/August, 2010:
- ATM Area (ERAM, STARS), UAS Area (Pred-B, Shadow)
8. AgentFly Demonstration – September, 2010:
- ATM Area (ERAM)
9. SNT Human- in-the-Loop (HITL) 1.5 (Part-Task) – November, 2010:
- VAIE (Tower)
10. UAS Mini-Initial NAS Integration (INI) – December, 2010:
- ATM Area (STARS), UAS Area (Shadow, FMS)
11. Four Dimensional Flight Management Systems Trajectory Based Operations (4DFMSTBO) – May, 2011:
- ATM Area (ERAM), TMA
12. Staffed NextGen Tower (SNT) HITL 2.0 – June, 2011:
- VAIE (Tower)
13. Multi-UAS Operational Assessment: Victorville, CA – August/September, 2011:
- UAS Area (Pred-B, Shadow)
14. Net Enabled Operations (NEO) Demonstration 5 – September, 2011:
- UAS Area (Shadow, FMS)
15. UAS NextGen Demonstration 4 – Simulation #1 - November, 2011:
- ATM Area (ERAM), UAS Area (Pred-B)
16. Net Enabled Operations (NEO) Demonstration 6 – November, 2011:
- ATM Area (ERAM), UAS Area (Shadow, FMS)
17. Aircraft Access to SWIM (AAtS) – March/May, 2012:
- ATM Area (AOC, ERAM, STARS), RCS
18. PHL Familiarization Study – April /May, 2012:
- VAIE (Tower)
19. UAS Demo 4, Simulation #2 – April, 2012:
- ATM Area (ERAM), UAS Area (Pred-B)
20. Weather Technology in the Cockpit (WTIC) – July/August, 2012:
- AOC, RCS
21. DREN (DOD Research and Engineering Network) – August, 2012:
- ATM Area (ERAM, STARS), RCS, VAIE (Tower)
22. UAS Maintenance and Repair (M&R) HITL – December, 2012/January, 2013:

- ATM Area (STARS), UAS Area (ScanEagle), VAIE (Tower)
- 23. Weather Symbology Study – February, 2013:
 - ATM Area
- 24. UAS C2 HITL Simulation to Investigate Operationally Acceptable Control Latencies in UAS During Critical Phases of Flight – March and April, 2013:
 - UAS Area (Pred-B)
- 25. Boeing International Distributed Simulation (BIDS) Test Event – March, 2013:
 - ATM Area (ERAM, STARS), VAIE
- 26. Common Support Service-Weather (CSS-Wx) Joint CE Demo – July, 2013:
 - ATM Area (ERAM, TSD), RCS
- 27. UAS IRSA Simulation – July, 2013:
 - UAS Area (Pred-B)
- 28. MiniGlobal – August, 2013:
 - ATM Area (ERAM)
- 29. NASA Langley/FAA Joint Simulation Mini-demo – June/September, 2013:
 - ATM Area (ERAM, STARS), VAIE
- 30. UAS- Operational Assessment: Contingency Operations- January-May, 2014:
 - ATM Area (ERAM, STARS), UAS Area
- 31. UAS C2 SAA-Operationally Acceptable Control Latencies–Jan/Feb/March, 2014:
 - UAS Area (Pred-B, UATD)
- 32. Time-Based Flow Management (TBFM) Simulation – May, 2014:
 - ATM Area (ERAM), TMA
- 33. UAS DOD Joint Test Simulation - July/August, 2014:
 - UAS Areas (Global Hawk, Predator, ScanEagle, Shadow), ATM Area (ERAM, STARS)
- 34. NextGen Space Vehicle Operations (SVO) Simulation - October, 2014:
 - ATM Area (ERAM), Multi-purpose Area (TFM, prototyping), HADDS, TSD
- 35. Tactical Turbulence HOTL 1 Simulation - March, 2015:
 - RCS, Multi-purpose Area
- 36. Tactical Turbulence HOTL 2 Simulation - October, 2015:
 - RCS with OTW, Multi-purpose Area (AOC)

FY09

1. TMA Coupled Scheduling (TCS) – October, 2009

Purpose: to demonstrate the effects of coupled scheduling to Air Traffic Controller personnel (ATC). Coupled scheduling integrated En Route scheduling and arrival scheduling to de-conflict aircraft at adapted locations outside the TRACON boundary and provided delay distribution capabilities via the upstream coupled meter points. When coupled scheduling was adapted and active, flights that passed through a meter point arc coupled to a downstream meter fix were sequenced and scheduled at the meter point arc in consideration of the downstream metering situation. Coupled scheduling allowed segmentation of the metering design such that segmented streams could be manipulated

without rescheduling all aircraft passing through the associated arrival meter fix(es). The NIEC Team worked with FTI, TMA, HADDS and I2F personnel to successfully complete the TCS simulation using the Air Traffic Generator (ATG) from NASA Ames, and the Simulation Interface Process (SIP) from Computer Science Corporation in the NIEC Support Room as the driving force to connect to TMA and HADDS in I2F. NIEC personnel issued pilot commands through ATG, and the controllers were able to see the effects on the DSR displays in the I2F.

Sponsor Name and Organization: Balinda Moreland, AJR-4

Principal Investigator: Brian Stein, CSC

Technical Partners: FTI, HADDS, I2F, TMA

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: (ATG), (SIP), data recording

Shakedown: September 7 – 11, 2009
September 14 – 18, 2009
September 21 – 25, 2009
September 28 – October 2, 2009
October 5 – 9, 2009
November 16-20, 2009

Simulation: October 13-16, 2009

2. NKT (Cherry Point, NC) UAS Simulation – December, 2009

Purpose: to explore a proposed operational concept and to collect data which may support future evaluations. Specifically, objectives of this modeling and simulation activity were to model operational procedures (i.e., UAS transit between restricted areas and Cherry Point Class D airspace, with the human-in-the-loop capability), model specific elements of a proposed GBSAA concept, which alerted the Ground-based sense-and-avoid Electronic Observer (GEO) to the presence of potential threats using an audio/visual alerting system, and to evaluate the effect of different wind levels on the proposed operation. This study explored a concept using ground-based sense-and-avoid (GBSAA) operations, including radar. Specifically, this plan addressed the flight of the RQ-7B Shadow UA through two NAS transit operational volumes while it transitioned to and from restricted airspace used for flight training. It presented a method of UAS operations using surveillance radar and appropriate procedures to establish a zero conflict airspace (ZCA) surrounding the transit operational volumes between MCAS Cherry Point Class D Surface Area (CDSA) and Restricted Areas. The information exchanges/communications and interactions between USMC UAS operators, the RQ-7B Shadow system and the air traffic control (ATC) operators and system was analyzed. This simulation took place in the TGF Display Lab, as the NIEC was being built.

Sponsor Name and Organization: Paula Nouaragas, AJP-65

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: DESIREE, Shadow Simulator, data recording

Demonstration: October 29, 2009

Scenario Development: November 4, 2009
November 10-13, 2009

Shakedown: November 16-20, 2009

Simulation: December 1-3, 2009

3. UAS Achieved Performance – Shadow – December, 2009

Purpose: to verify and calibrate the RQ7 Shadow Simulator as the precursor to validation activities to support UAS integration into the Next Generation National Airspace Transportation System.

Sponsor Name and Organization: UAS Program Office/UAS FAA Industry Team (UFIT)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Shadow)

Shakedown: December 21, 2009

Simulation: December 22, 2009

FY10

4. Staffed NextGen Tower (SNT) 1.0 – February-May, 2010

Purpose: to conduct a comparison of the features available in ASDE-X with features being developed by MIT-LL in an application called Tower Information Display System (TIDS) and Flight Data Management (FDM), and the combined operations of out-the-window (OTW) views in both nominal and off-nominal conditions. SNT HITL 1.0 concept examined the impact on airport throughput and controller workload and performance of a tower traffic display that was certified for separation and paired with an integrated electronic flight strip replacement.

Sponsor Name and Organization: Michele Triantos, AJP-66

Principal Investigator: Monicarol Nickelson, ANG-D11

Technical Partners: MIT/LL, TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: VAIE (Tower), DESIREE, TGF, ASDE-X, FDM, TIDS, audio, video and data recording,

Shakedown: December 7-11, 2009

December 14 – 17, 2009 * also Simulation Pilot familiarization
January 4 - 8, 2010 * also Simulation Pilot familiarization
January 11 - 15, 2010
January 18-22, 2010 *tower displays moved into NIEC & tested
January 25-29, 2010 *first shakedown with SMEs using the VAIE
February 1-5, 2010
February 8-12, 2010
February 15-19, 2010
Simulation: February 22-26, 2010
March 1–5, 2010
March 8–12, 2010
March 22–26, 2010
April 12-16, 2010
April 19–23, 2010
April 26–30, 2010
May 3–7, 2010

5. UAS Achieved Performance – Predator-B – May, 2010

Purpose: to verify and calibrate the 6 Degrees of Freedom aircraft model of the MQ-9 Predator-B installed in the UAS Area of the NIEC. Once the performance of the model was verified, the HITL (human-in-the-loop) real-time simulator it supports was approved for use to realistically represent performance of the MQ-9 in the NAS and NextGen environments to gather data in support of goals identified in the UAS Integration Evaluation plan.

Sponsor Name and Organization: UAS Program Office/UAS FAA Industry Team (UFIT)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Predator-B)

Preliminary testing: December 21-22, 2009

Simulation: May 26, 2010

6. NIEC Ribbon Cutting/Opening Day Ceremonies – June, 2010

Purpose: This was the official Ribbon Cutting Ceremony and Opening Day of the NextGen Integration and Evaluation Capability. Many VIPs were in attendance, including Victoria Cox, Senior VP for NextGen & Operations Planning, Dr. Wilson Felder, WJHTC Director, and Frank LoBiondo, New Jersey Congressman. An Open House was held all afternoon.

Sponsor Name and Organization: Sheila Franklin-Smallwood, AJP-78

Principal Investigator: Hilda DiMeo, ANG-E14

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: ATM Area (ERAM, STARS), UAS Area (Shadow), RCS, VAIE (Tower), MPA, DESIREE, TGF, audio, video and data recording

Shakedown: November 23, 2009
January 19, 26, 2010
February 2, 2010
March 11, 2010
March 15-18, 2010

Preparation/VIP Dry Run Rehearsals: April 5-9, 2010
May 10, 13, 2010
June 1, 2010

Simulation: June 7, 2010

7. UAS Initial NAS Integration (INI) – May/June/August, 2010

Purpose: to advance the integration of UAS operations in the NAS, provide the FAA confidence in the safety case for UAS, provide a platform for validation of RTCA SC-203 UAS performance requirements under development in 2010, and utilize the advanced capabilities of the UAS community to serve as a test bed for exploring future concepts for 4D TBO. The objective of the initial UAS-NAS integration simulations was to obtain data that helped evaluate the viability of safe integration of UAS into the NAS. The data resulting from these simulations was used to help establish a “baseline” of today’s NAS (2010), against which future work can be compared.

Sponsor Name and Organization: UAS Program Office/UAS FAA Industry Team (UFIT)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: ATM Area (ERAM, STARS), UAS Area (Pred-B, Shadow), DESIREE, TGF, audio, video and data recording

Shakedown: April 13-15, 2010
April 27-29, 2010

Simulation (Group II): May 19-21, 2010
May 24-26, 2010

Simulation (Group III): June 8-11, 2010
June 14-15, 2010

Simulation (Group I): August 17-20, 2010
August 23-24, 2010

8. AgentFly Demonstration – September, 2010

Purpose: This was a demonstration of the Air Traffic Controller (ATC) process, using the En Route R & D displays, in the ATM Area of the NIEC. This demonstration supported the development of an ATC software Agent that mimics the tasking of controllers. Members of the collaborative team from Drexel University and The Czech Republic University observed the demonstration. The ATC Agent is used in fast-time simulation, supporting NextGen Concepts of Operation and UAS integration into the National Airspace System.

Sponsor Name and Organization: Albert Schwartz, AJP-661

Principal Investigator: Albert Schwartz, AJP-661

Technical Partners: N/A

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: ATM Area (ERAM), DESIREE

Scenario Development: August 23-27, 2010

Shakedown: August 30-September 1, 2010

September 6-10, 2010

Demonstration: September 14-15, 2010

9. SNT Human- in-the-Loop (HITL) 1.5 (Part-Task) – November, 2010

Purpose: to begin to evaluate the integration of camera views with the SNT displays and out-the-window displays. Evaluation included the ability of ATC detection of off-nominal events, comparing features available in ASDE-X with features being developed by MIT-LL in an application called Tower Information Display System (TIDS) and Flight Data Management (FDM). User feedback was elicited for the CHI development. This effort helped define requirements for the SNT HITL2 study and DFW-2 demonstration activities. There were thirteen off-nominal events, switching the VAIE from night to day, and camera conditions that occurred during every fifteen minute segment.

Sponsor Name and Organization: Michele Triantos, AJP-66

Principal Investigator: Ferne Friedman-Berg, ANG-E25

Technical Partners: MIT/LL, TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: VAIE (Tower), DESIREE, TGF, ASDE-X, FDM, TIDS, audio, video and data recording, Eye Tracker

Terminal Information Display System (TIDS) Testing: May 11-13, 2010

Shakedown: June 1-4, 2010

June 8-10, 2010

<u>Camera Setup in VAIE (Tower):</u>	June 16-18, 2010
<u>Camera Testing in VAIE:</u>	September 7-9, 2010
<u>Scenario Development:</u>	September 13-17, 2010
<u>Shakedown:</u>	September 20-24, 2010
	September 27-October 1, 2010
	October 18–22, 2010
	October 25-27, 2010
<u>Simulation:</u>	November 2-4, 2010

10. UAS Mini-Initial NAS Integration (INI) – December, 2010

Purpose: To perform a Human-in-the-Loop simulation incorporating the Shadow simulator with FMS flown by an AAI pilot. It showed the initial NAS integration where the Shadow pilot interacted with ATC Subject Matter Experts and Pseudo Pilots, using DESIREE and TGF.

Sponsor Name and Organization: UAS Program Office/UAS FAA Industry Team (UFIT)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: ATM Area (STARS), DESIREE, TGF, UAS Area (Shadow Simulator, FMS), audio, video and data recording

Shakedown: November 2-4, 2010
November 30-December 2, 2010

Simulation: December 14-16, 2010

FY11

11. Four Dimensional Flight Management Systems Trajectory Based Operations (4DFMSTBO) – May, 2011

Purpose: The focus of this project assessed pilot and controller issues linked to trajectory-based operations, using the Estimated Time of Arrival (ETA) function of aircraft Flight Management Systems (FMS). The HITL simulation integrated the emulation of the En Route ATC system (ERAM), including medium-high-fidelity TMA functionality at a low/moderate arrival flow to a TMA-designated metering fix, with aircraft using FMS with varied levels of ETA capabilities.

Sponsor Name and Organization: Neal Suchy, AJP-67

Principal Investigator: Tom Teller, MIT/LL

Technical Partners: TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: ATM Area (ERAM), MPA (TMA system),
DESIREE, TGF, audio, video and data recording

Scenario Development: March 14-18, 2011

March 21-25, 2011

Shakedown: April 4-7, 2011

April 26-28, 2011

Simulation: May 10-12, 2011

May 24-26, 2011

12. Staffed NextGen Tower (SNT) HITL 2.0 – June, 2011

Purpose: to assess the tools and applications that would be necessary to perform ATC Tower operations at a given airport from an adjoining TRACON. This simulation concentrated on further tests with TIDS, utilizing embedded cameras in the TIDS application for monitoring aircraft circumstances, as well as the new ASL Eye Tracking System. The project studied the use of camera placement for ATC Subject Matter Experts.

Sponsor Name and Organization: Michele Triantos, AJP-66

Principal Investigator: Ferne Friedman-Berg, ANG-E25

Technical Partners: TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: VAIE (Tower), DESIREE, TGF, TIDS,
audio, video and data recording, Occulometer

Shakedown: May 11–13, 2011

May 17–19, 2011

May 23–27, 2011

May 30–June 3, 2011

Simulation: June 7-9, 2011

June 14–16, 2011

June 21–23, 2011

June 28–30, 2011

Demonstration: August 18, 2011

September 20-21, 2011

September 27-28, 2011

13. Multi-UAS Operational Assessment: Victorville, CA – August/September, 2011

Purpose: to identify and document events associated with mixing multiple, dissimilar, UAS operations with manned aircraft operations specifically within the Class D airspace

of the Southern California Logistics Airport, Victorville, CA (KVCV). The scope of the effort was scaled to match the exploratory nature of the design approach. It was conducted by FAA Engineering Development Services (AJP-65) at the FAA's Tower Visualization System in the Airport Facility Terminal Integration Laboratory (AFTIL), using support from several other Laboratory Services teams (AJP-7), and Serco Inc. air traffic controllers who supplied contract tower services at KVCV.

*NIEC personnel assisted throughout the development and execution of this project with scenario development and testing, and built a new ATC system, the ReHost, to mimic the one that is in place at Victorville.

Sponsor Name and Organization: FAA Engineering Development Services (AJP-65)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B, Shadow), DESIREE, TGF, audio, video and data recording

Shakedown: June 21-23, 2011

July 12-14, 2011

August 22, 2011

Simulation: August 23-26, 2011

August 29-September 1, 2011

14. Net Enabled Operations (NEO) Demonstration 5 – September, 2011

Purpose: This was a real-time, human-in-the-loop simulation to investigate the integration of Unmanned Aircraft Systems (UAS) into the NAS. The goal of "NEO Demo 5" was to explore the NextGen concept of 4-Dimensional Trajectory Based Operations (4DT TBO) and data sharing, within the scope of specific UAS hazards such as the loss of command and control ("lost-link"). Demo 5 utilized the UAS Area of the NIEC and STARS laboratory to conduct simulated flights of a Textron AAI RQ-7B Shadow UAS equipped with a GE Flight Management System (FMS). The simulation explored how a UAS equipped with FMS dynamically exchanged aircraft intent information with an air traffic control automation system (STARS).

Sponsor Name and Organization: The Research, Technology, and Development Group (AJP-67) and FAA Engineering Development Services Group (AJP-65)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Shadow, FMS), STARS connection, audio, video and data recording

Simulation: September 20-22, 2011
September 27-29, 2011

15. UAS NextGen Demonstration 4 – Simulation #1 - November, 2011

Purpose: UAS Demo 4 – Sim 1 consisted of two research activities: a human-in-the-loop simulated flight at the FAA’s NextGen Integration and Evaluation Capability (NIEC), and a field flight at Cape Canaveral Air Force Station in Florida in December, 2011. In pursuit of seamless integration of Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS), “Demo 4” continued to explore and evaluate the effects of adding a Cockpit Display of Traffic Information (CDTI) to the General Atomics’ MQ-9 Predator B UAS pilot’s tool suite. This study incorporated multiple surveillance feeds to the CDTI (including primary radar), and a future communication system (i.e., integrated IP addressable NextGen Voice Switch). This was supported by NATCA field participants, UAS Industry pilots, and simulation pilots.

Sponsor Name and Organization: The Research, Technology, and Development Group (AJP-67) and Engineering Development Services Group (AJP-65)

Principal Investigator: Deepak Chauhan, ANG-C33

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B), ATM Area (ERAM), DESIREE, TGF, audio, video and data recording, Occulometer

Scenario Development: July 26-28, 2011
August 16-18, 2011

Shakedown: September 13-15, 2011
October 18-20, 2011

Simulation: November 1-3, 2011

16. Net Enabled Operations (NEO) Demonstration 6 – November, 2011

Purpose: NEO Demo 6 built upon the effort of NEO Demo 5 and UAS NextGen Demo 4. NEO Demo 6 continued to explore the NextGen concept of 4DT TBO and data sharing, within the scope of specific UAS hazards such as the loss of command and control “lost-link”. The data sharing scope was expanded to create a much larger network of publishers and subscribers to include the NextGen Florida Test Bed. It also integrated an additional automation system, ERAM.

Sponsor Name and Organization: The Research, Technology, and Development Group

(AJP-67) and FAA Engineering Development Services Group (AJP-65)

Principal Investigator: Karen Buondonno, ANG-C32

Technical Partners: inter-agency and industry partners, TGF, Florida Test Bed (FTB)

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: ATM Area (ERAM), UAS Area (Shadow, FMS), DESIREE, TGF, STARS connection to R& D Enclave, audio, video and data recording

Shakedown: October 25-27, 2011

Simulation: November 15-17, 2011

FY12

17. Aircraft Access to SWIM (AAtS) – March/May, 2012

Purpose: The NextGen Implementation Plan (NGIP) identified a need for an airborne component of the SWIM Service Oriented Architecture (SOA), subsequently named Aircraft Access to SWIM (AAtS), to define how to provide a connection between SWIM SOA shared NAS resources and aircraft while in the air or on the ground. The simulation focused on concept development of providing weather display overlaid on an aircraft avionics Electronic Flight Bag (EFB) or Class II Portable Electronic Device (PED). Later phases of the project will focus on the technical aspect of Broadband Data Transport and/or Content Management service providers.

Sponsor Name and Organization: Pamela Dees, AJR-53

Principal Investigator: Ben Willems, ANG-E25, and Alyssa Andrews (BAH)

Technical Partners: CSF, TGF, SWIM personnel

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: ATM Area (AOC, ERAM, STARS), DESIREE, RCS, TGF, audio, video and data recording, Occulometer

Shakedown #1: March 5, 2012

Shakedown #2: April 23-26, 2012

Simulation Part 1: March 6-9, 2012

Simulation Part 2: May 15-17, 21-22, 29-June 1, 2012

18. PHL Familiarization Study – April /May, 2012

Purpose: The Human-in-the-Loop (HITL) simulation was used to conduct an airspace familiarization study for new modifications to departure procedures in the terminal

airspace surrounding PHL. TGF was used to drive the STARS Lab, as well as the VAIE in the NIEC.

Sponsor Name and Organization: Adam Greco, ANG-E71

Principal Investigator: Adam Greco, ANG-e71

Technical Partners: TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: VAIE, Multi-purpose Area, DESIREE, rbx, TGF

Shakedown: March 5-9, 2012

Simulation: April 2-6, 11-13, 16-20, 23-27, 30, 2012

May 1-4, May 7-11, 14-18, 23-25, 29-31, 2012

June 1, 2012

19. Unmanned Aircraft Systems (UAS) Demo 4, Simulation #2 – April, 2012

Purpose: In pursuit of seamless integration of Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS), “Demo 4” continued to explore and evaluate the effects of adding a Cockpit Display of Traffic Information (CDTI) to the General Atomics’ MQ-9 Predator B UAS pilot’s tool suite. This study consisted of two activities. The first activity was a Human-In-The-Loop simulation incorporating multiple surveillance feeds to the CDTI (including primary radar), and a future communication system (i.e., integrated IP addressable NextGen Voice Switch). The second activity was a Dry Run for the Live Flight at Cape Canaveral Air Force Station in Florida in May, 2012. Both activities occurred in the FAA’s NextGen Integration and Evaluation Capability (NIEC). This was supported by NATCA field participants and UAS Industry pilots.

Sponsor Name and Organization: Damon Thomas, ANG-C53

Principal Investigator: Deepak Chauhan, ANG-C33

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B), ATM Area (ERAM),
DESIREE, TGF, audio, video and data recording,
Occulometer

Shakedown #1: February 14-16, 2012

Shakedown #2: March 27-29, 2012

HITL simulation: April 16-20, 2012

Dry Run for Live Flight: April 23-24, 2012

20. Weather Technology in the Cockpit (WTIC) – July/August, 2012

Purpose: The purpose of the simulation was to better understand pilot decision-making when provided with adverse weather situational awareness during transoceanic flights, and through the Intertropical Convergence Zone (ITCZ).

Sponsor Name and Organization: AJP-6810

Principal Investigator: NCAR personnel, Tenny Lindholm and Cathy Kessinger

Technical Partners: Simulation Branch (TGF DANSIG, CSF)

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: AOC, DESIREE, RCS, TGF, audio, video and data recording

Demonstration Readiness Review: June 11-15, 2012

Shakedown: July 9-13, 2012

Simulation: July 30 – August 3, 2012

21. DREN (DOD Research and Engineering Network) – August, 2012

Purpose: The purpose was an end-to-end demonstration showing the integration of several NIEC capabilities/suites, such as the ATM Area, Multi-purpose Area, DESIREE-ERAM, DESIREE-STARs, RCS, TGF, and the VAIE, with the DREN and other Cockpit Simulators (NASA Langley, NASA AMES, BOEING Palmdale, BOEING PHL, PAX River), using DFW airspace.

Sponsor Name and Organization: Dr. Wilson Felder, ANG-E

Principal Investigator: Hilda DiMeo, ANG-E14

Technical Partners: Boeing, LabNet, TGF

NIEC Project Lead: Hilda DiMeo

NIEC capabilities and/or suites used: ATM Area (ERAM, STARs), MPA, DESIREE, RCS, TGF, VAIE (Tower), audio, video and data recording

Testing: July 30, 31, 2012
August 8, 13-17, 2012

Demo Dry Run: August 15, 20-22, 2012

Demonstration: August 23, 2012

FY13

22. UAS Maintenance and Repair (M&R) HITL – December, 2012/January, 2013

Purpose: The simulation focused on UAS aircraft failure scenarios and associated ATC communications/emergency procedures resulting from inadequate maintenance and repair/inspection practices. The study should provide data and information to aid in defining procedural requirements and in populating the M&R prototype database with "simulated" failure data in a controlled environment. For this study, the ScanEagle UAS simulator, the VAIE, and 2 of the Terminal Radar ATC consoles in the NIEC were used. Subject Matter Experts (SMEs) were used as ATC personnel, UAS pilots, Air Traffic Assistants, and over-the-shoulder observers. The simulation occurred in Class C ACY airspace with an ACY tower environment.

Sponsor Name and Organization: Silas Still, AFS-80

Principal Investigator: Cliff Johnson, ANG-E272

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (ScanEagle), ATM Area (STARS), DESIREE, TGF, VAIE, audio, video and data recording, Occulometer

Shakedown: November 27-29, 2012

HITL 1 simulation: December 11-14, 2012

HITL 2 simulation: January 7-14, 2013

23. Weather Symbolology Study – February, 2013

Purpose: to conduct a validation study to evaluate the effectiveness of the SAE G-10W MET symbols. The goal of the study was to determine if the symbol set is readily comprehended by pilots, and if there was any confusion among symbols that are presented. Static displays of data linked weather symbolology were presented for approximately 30 seconds. Following this, subjects were asked to describe the weather information they were just exposed to. Accuracy of the reported weather was calculated for each run. Upon completion of their response, the next scenario run was presented to the subject. Once all display trials were complete, subjects were asked to answer some open-ended survey questions about the new symbolology.

Sponsor Name and Organization: Ian Johnson, WTIC PO

Principal Investigator: Ulf Ahlstrom, with help from Erin Higgins, Jay Messina, and Scott Terrace

Technical Partners: N/A

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: ATM Area

Shakedown: January 24-25, 2013

February 8, 2013

Simulation: February 11-15, 19-21, 2013

24. UAS Control & Communications (C2) HITL Simulation to Investigate Operationally Acceptable Control Latencies in UAS During Critical Phases of Flight – March and April, 2013

Purpose: to examine the effects of control latency on UAS operations using the Predator simulator. Twelve UAS pilot participants completed the simulation. Each pilot was at the WJHTC NIEC for 2.5 days. They were presented with different aircraft control latencies in 6 test conditions for each participant. The participants completed take off, landing, and go-around scenarios. They also completed training scenarios prior to completing the test scenarios.

Sponsor Name and Organization: Ben Walsh and Kerin Olson, AFS-407

Principal Investigators: Eric Taylor, TG O'Brien, and Carolina Zingale, ANG-E25

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B), DESIREE, audio, video, and data recording

Shakedown: February 12, 2013
February 19-21, 2013

Simulation: March 4 – April 19, 2013

25. Boeing International Distributed Simulation (BIDS) Test Event – March, 2013

Purpose: to validate the effectiveness of the Distributed Simulation Transatlantic Flight capability of Boeing Palmdale, California, and Madrid, Spain, utilizing the NextGen Integration Evaluation Capability (NIEC) at the William J. Hughes Technical Center. The focus was to fly 2 simulated Boeing planes into Dallas-Fort Worth, Texas airspace and conduct Low Approaches at the DFW airport. The first flight was an FMS-modeled B737, which flew from Missouri to Arkansas and into DFW airspace. The second flight, a B777 simulator, flew direct from Madrid, jumping ahead several times and then into DFW. TGF disseminated the targets to the VAIE, which depicted the out the window view for the DFW Air Traffic Control Tower. DESIREE depicted TRACON Airspace for DFW (Approach & Departure), and displayed the targets in the ATM Area of the NIEC.

Sponsor Name and Organization: Boeing

Principal Investigator: Terry Layton

Technical Partners: Boeing, TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: ATM Area (ERAM, STARS), Multi-purpose Area, VAIE, DESIREE, TGF, video and data recording

Simulation: March 11, 2013

26. Common Support Service-Weather (CSS-Wx) Joint Capability Evaluation (CE) Demonstration – July, 2013

Purpose: to evaluate/demonstrate the “common weather picture” with simulated NAS systems and Electronic Flight Bag (EFB) on a R&D flight (N47). It is a collaborated effort between National Oceanic and Atmospheric Administration (NOAA), CSS-Wx, Aircraft Access to System Wide Information Management (AAtS), Weather Technology in the Cockpit (WTIC), and NextGen Integration Evaluation Capability (NIEC) teams. The demonstration will constitute the RCS accessing weather data from a real time WTIC AAtS-Data Management Service (DMS). This will be demonstrated with an iPad application developed by WTIC, and will take place in the NIEC, as well as in the FAA R&D flight N47. The WTIC AAtS-DMS will be a virtual machine (VM) provided by WTIC, and running in the VM host located at the Florida Test Bed. Weather data suppliers will be providing weather data to the CSS-Wx end points, including 4D Wx Data Cube, and simulated NAS systems will be accessing the weather data from the CSS-Wx endpoints. The weather data will be displayed in the ATM Area of the NIEC using the DESIREE version of ERAM and TSD, and in the RCS on the DESIREE version of the EFB.

Sponsor Name and Organization: Alfred Moosakhanian, AJM-333

Principal Investigator: Jen Lin, ANG-C34

Technical Partners: AAtS, NOAA, TGF, WTIC

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: ATM Area (ERAM, TSD), MPA, RCS, DESIREE, TGF, audio, video, and data recording

Shakedown: March 25, 2013
April 1 and 8, 2013
May 14, 2013
June 12 and 25, 2013
July 29, 2013

Simulation: July 30, 2013

27. UAS Information Requirements for Sense and Avoid (IRSA) Simulation – July, 2013

Purpose: to determine the minimum necessary sense and avoid (SAA) information required for UAS Pilots to execute Collision Avoidance Maneuver.

Sponsor Name and Organization: Paul Campbell, UAS Office, AFS-80

Principal Investigator: Ferne Friedman-Berg, ANG-E25

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B), DESIREE, audio, video, and data recording

Shakedown: June 18-20, 2013
June 24-27, 2013
July 8-12, 2013
July 16-18, 2013
July 22-26, 2013

Simulation: July 29-31, 2013
August 1-2, 2013
August 5-9, 2013
August 12-16, 2013
August 19-23, 2013
August 26-28, 2013
September 4-6, 2013
September 9-13, 2013
September 16-20, 2013

28. MiniGlobal – August, 2013

Purpose: it is a multi-stage project. The initial stage was a NIEC activity to integrate 6-8 ERAM ARTCCs with a CONUS flight sample, with ERAM outputting its data through a HADDS. The NIEC has core expertise in generating CONUS flight samples, as well as the proximity of the TGF team for integration efforts of the radar feeds. This was not a DESIREE-ERAM based simulation. It utilized the ATM Area and ERAM-in-a-box as configured by Lockheed Martin for the ERAM ARTCCS.

Sponsor Name and Organization: Hilda DiMeo, ANG-E14

Principal Investigator: Nick Marzelli, ANG-E143

Technical Partners: Lockheed Martin, TGF

NIEC Project Lead: Nick Marzelli

NIEC capabilities and/or suites used: ATM Area (ERAM), TGF, data recording

Shakedown: July 24, 2013
Simulation: August 15-30, 2013

29. NASA Langley/FAA Joint Simulation Mini-demo – June/September, 2013

Purpose: to validate the effectiveness of a joint simulation capability. NASA/Langley Research Center provided a manned jet transport simulator cab that was integrated into a simulated Air Traffic Control (ATC) environment utilizing the NextGen Integration Evaluation Capability (NIEC) at the William J. Hughes Technical Center. The first

simulation was when NIEC received the state data from NASA Langley's Research Cockpit Simulator (RCS) and integrated it so that it appeared as a target in the VAIE, with Air Traffic Control (ATC) communication from the VAIE to NASA Langley's cockpit simulator pilot via telephone recorded. The second simulation was the NIEC displaying aircraft targets in the VAIE, and sending the flight information to NASA Langley, to be viewed and recorded in their RCS. This was successfully achieved on September 19-20, 2013, with shakedown occurring on September 18, 2013. The sponsor was NASA/Langley – Simulation Development and Analysis Branch, and the Principal Investigator was Harry Verstynen. Additionally, the two teams may collaborate on a white paper to be published and presented at a future date.

Sponsor Name and Organization: NASA Langley – Simulation Development and Analysis Branch

Principal Investigator: Harry Verstynen, NASA Langley

Technical Partners: NASA Langley, TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: ATM Area (ERAM, STARS), MPA, VAIE, DESIREE, TGF, audio, video and data recording

<u>Shakedown (1):</u>	June 6, 2013
<u>Simulation 1:</u>	June 11, 2013
<u>Shakedown (2):</u>	July 1-2, 2013
	September 18, 2013
<u>Simulation 2:</u>	September 19, 2013

FY14

30. UAS- Operational Assessment: Contingency Operations- January-May, 2014

Purpose: The UAS Operational Assessment: Contingency Operations project utilized the FAA's NextGen Integration and Evaluation Capability (NIEC) to investigate the effects of contingency procedures in a COA on the NAS. As a real-time, human-in-the-loop simulation, this task explored the effects of UAS contingency operations on air traffic controllers. Scenarios for the study were conducted in the airspace surrounding the Northern California TRACON (NCT) area. Contingency Operations that were simulated consisted of emergency divert situations, lost link, lost communication, fly away, and flight termination.

Sponsor Name and Organization: Kerin Olsen, AFS-407

Principal Investigator: Bina Pastakia, ANG-C32

Technical Partners: inter-agency and industry partners, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: ATM Area (ERAM, STARS), UAS Area, MPA,

DESIREE, TGF, audio, video, and data recording

Shakedown: November 12-15, 2013
November 18-21, 2013
December 9-12, 2013

Simulation: January 7-10, 2014
January 14-16, 2014
January 28-30, 2014
February 11-13, 2014
February 19-21, 2014
March 4-6, 2014
March 11-13, 2014
March 18-20, 2014
March 25-27, 2014
April 15-17, 2014
April 22-24, 2014
April 29-May 1, 2014
May 13-15, 2014

31. UAS C2 SAA - Operationally Acceptable Control Latencies – January/February/March, 2014

Purpose: This simulation was conducted to investigate operationally acceptable control latencies for UAS with low levels of autonomy during nominal and off-nominal (sense and avoid) events, specific to UAS Task 13-02b-0. Twelve UAS pilots each spent 2.5 days completing the simulation. One pilot participated in the simulation at a time. Participants flew short scenarios under different control latency conditions and used the Unmanned Aircraft Traffic Display (UATD) to determine the presence of threat aircraft and executed evasive maneuvers to avoid collisions, if necessary.

Sponsor Name and Organization: Ben Walsh and Kerin Olson, AFS-407

Principal Investigator: Carolina Zingale, ANG-E25

Technical Partners: inter-agency and industry partners

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Area (Pred-B simulator, UATD), DESIREE, audio, video, and data recording

Shakedown: January 13, 2014

Simulation: January 14-15, 2014
January 29-31, 2014
February 3-7, 2014
February 10-14, 2014
February 19-21, 2014
March 3-7, 2014
March 10-14, 2014

March 17-21, 2014
March 24-28, 2014

32. Time-Based Flow Management (TBFM) Simulation – May, 2014

Purpose: to compare the effectiveness of Miles-In-Trail and Time-Based Metering using 3 and 6 metering streams. The Human-in-the-Loop (HITL) experiment used ZOB48 and ZOB49. One upstream and one downstream sector were also used, and were located in another ARTCC. The Metering Reference Point Views (TMA-list) supported up to at least 6 metering sub-lists coming from several TMAs.

Sponsor Name and Organization: Karen Bohannon, AJM-22

Principal Investigator: Ben Willems, ANG-E25

Technical Partners: TGF

NIEC Project Lead: Terence Moore

NIEC capabilities and/or suites used: ATM Area (ERAM), MPA, DESIREE, TGF,
TMA, audio, video, and data recording

Shakedown: February 11-13, 2014

Simulation (HITL 1): March 31-April 4, 2014
April 7-11, 2014

Simulation (HITL 2): May 5-9, 2014
May 12-15, 2014

33. UAS DOD Joint Test Simulation - July/August, 2014

Purpose: to examine the effects of contingency operations using four UAS platforms. The Human-in-the-Loop (HITL) experiment used 3-5 joint use (DOD/FAA) airfields, En Route, and TRACON surrounding the Grand Forks, North Dakota area. The HITL used multiple scenarios, with contingency events scattered throughout.

Sponsor Name and Organization: DOD personnel

Principal Investigators: Ferne Friedman-Berg, ANG-E25; Cliff Johnson, ANG-E272

Technical Partners: inter-agency and industry partners, AFTIL, TGF

NIEC Project Lead: Robin Peterson-Brown

NIEC capabilities and/or suites used: UAS Areas (Global Hawk, Predator, ScanEagle, Shadow), ATM Area (ERAM, STARS), MPA, DESIREE, TGF, audio, video, and data recording

Shakedown: May 19-23, 2014
June 16-20, 2014
June 24-26, 2014

Dress Rehearsal: July 9-11, 2014

UAS Pilot Training: July 15-18, 2014

Simulation: July 21-25, 2014
July 28 - August 1, 2014

34. NextGen Space Vehicle Operations (SVO) Simulation - October, 2014

Purpose: real-time space vehicle operations, both nominal and off nominal. The NextGen Space Vehicle Operations (SVO) program concept focuses on the introduction of space trajectories into existing NAS human and automation systems. Processing these launch requests and vehicle integration requires greater understanding of space vehicle trajectories and manipulation of Special Activity Areas (SAAs). SVO research requires analysis of space vehicles to include launch patterns, trajectory characteristics, safety data, locations, communication and surveillance requirements, expected launch frequencies, and impact to airborne and ground aircraft.

For each scenario, a space vehicle was tracked with status/position displayed within the NIEC air traffic automation systems, including ERAM and the Traffic Flow Management System (TFMS) Traffic Situation Display (TSD). Four En Route sectors were staffed for each scenario along with a Traffic Management Coordinator position. Simulation pilots were used to manage normal NAS traffic volume for adjacent Air Route Traffic Control Center (ARTCC) sectors. For launch operations, a space transition corridor (STC) was displayed for ERAM and the Traffic Flow Management System (TFMS) tools. During off-nominal operations, debris fields were displayed within ERAM and the TFMS.

Sponsor Name and Organization: Kevin Hatton, ANG-C42

Principal Investigators: Daniel Johnson, ANG-E25; Randy Sollenberger, ANG-E25

Technical Partners: ACTA, TGF, Volpe

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: ATM Area (ERAM), ATM alcove (launch, monitoring), Multi-purpose Area (TFM, prototyping), DESIREE, HADDS, TSD, TGF, audio, video, and data recording

Scenario Development: August 5-8, 2014
August 26-28, 2014
September 28-October 2, 2014

Shakedown: September 23-25, 2014
October 7-9, 2014

Simulation: October 21-23, 2014
October 28-30, 2014

FY15

35. WTIC (Weather in the Cockpit) Tactical Turbulence HOTL 1 Simulation - March, 2015

Purpose: to perform the initial planning for service analyses to assess feasibility, identify preliminary high level capabilities and implementations for tactical turbulence alerting in the cockpit, and associated concepts of use. This initial planning effort was a first step toward a multi-year project to develop, demonstrate and evaluate concepts and technologies with the intent of developing, verifying and validating requirements to provide warning information. The project focused on the use of tactical information on iPads (used as external flight bags [EFBs]) to mitigate turbulence injuries.

Sponsor Name and Organization: Eldridge Frazier, ANG-C61

Principal Investigators: Tenny Lindholm and Gary Blackburn, NCAR

Technical Partners: BCI, CSF, FTB, NCAR

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: RCS, Multi-purpose Area (launch, monitoring, Flight coordination), DESIREE, audio, video, and data recording

Shakedown: February 17-18, 2015
March 3-4, 2015

Simulation: March 17-19, 2015

36. WTIC (Weather in the Cockpit) Tactical Turbulence HOTL 2 Simulation - October, 2015

Purpose: to address the problem of commercial and general aviation aircraft encountering unexpected turbulence with a focus on the use of tactical information on iPads (used as external flight bags [EFBs]) to mitigate turbulence injuries. The Tactical Turbulence HOTL2 Simulation used archived gridded data from National Center for Atmospheric Research (NCAR)'s NEXRAD Turbulence Detection Algorithm (NTDA), which detects in-cloud turbulence, incorporated into a turbulence "nowcast" that also includes clear-air, mountain wave, and out-of-cloud convectively-induced turbulence information. This prototype tactical turbulence product is referred to as the NTDA-enhanced Graphical Turbulence Guidance Nowcast (NTDA-GTGNow), and represented actual airline turbulence encounters as the basis for eight selected weather scenarios. The overall research project goals are to identify a recommended method for presenting weather alerts and to demonstrate the feasibility of implementing the alerts with the necessary latency via a network connection similar to Aircraft Access to System Wide Information Management (SWIM) [AAtS].

Sponsor Name and Organization: Eldridge Frazier, ANG-C61

Principal Investigators: Tenny Lindholm and Gary Blackburn, NCAR

Technical Partners: BCI, CSF, NCAR, TGF

NIEC Project Lead: Mary Delemarre

NIEC capabilities and/or suites used: RCS (with the OTW) and 3 WTIC provided iPads, Multi-purpose Area (launch, monitoring, AOC/ATC using 1 WTIC iPad and 1 NIEC iPad, DESIREE, audio, video, and data recording, and turbulence screen captures)

Engineering Feasibility Test: September 9-10, 2015

Shakedown: September 22-24, 2015

Simulation: October 6-8, 2015

October 14-16, 2015