NextGen Integration and Evaluation Capability

Location

The NextGen Integration and Evaluation Capability (NIEC) is located at the Federal Aviation Administration William J. Hughes Technical Center (WJHTC) in Pomona, New Jersey.

Description

The NIEC is the FAA's research platform to explore, integrate, and evaluate NextGen concepts through simulation activities resulting in concept maturation and requirements definition. The NIEC can be used to conduct early proof of concept studies, rapid prototyping, validate and mature concepts, mitigate risks, and improve operational performance across all NextGen solution sets. The NIEC complements the unique NAS facilities and aviation based systems located at the WJHTC. The design of this environment provides for integration of capabilities located at other labs within the FAA WJHTC, as well as those located at non-FAA facilities, such as academia, industry and other government locations.

Characteristics of the NIEC include:

- A real-time, rapid prototyping and simulation environment that simulates the NAS while integrating NextGen enabling components
- Representation and integration across multiple NAS domains in one facility
- Inclusion and integration of future capabilities
- Technical Center and external laboratory integration capabilities
- Voice communications capabilities
- Audio, video, and data recording capabilities
- Flexibility to support multiple concurrent studies
- Available 24 hours per day 7 days a week
- Certified ISO 9001:2008 laboratory

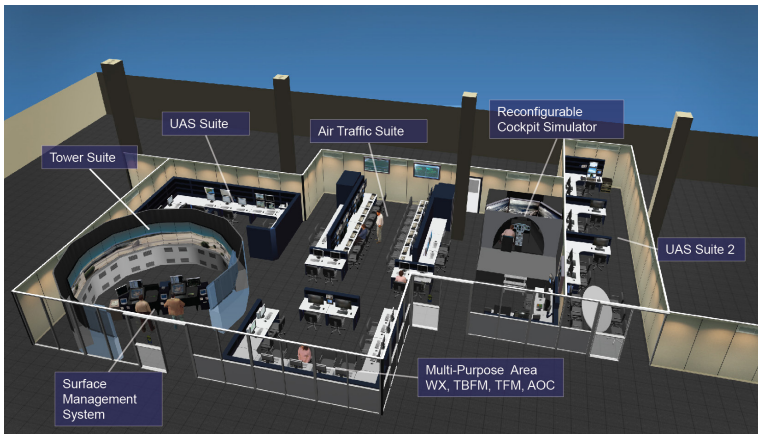


Figure 1 NIEC floor plan layout

Mission

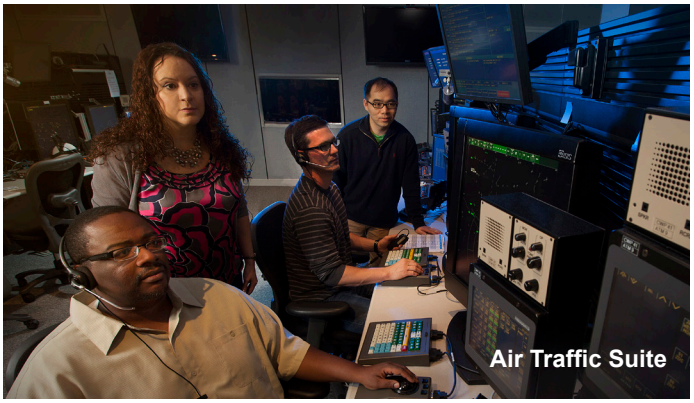
The NIEC's mission is to foster the exploration, evaluation, and integration of NextGen enabling components within a rapid prototyping environment for concept validation and maturation.

Purpose

The NIEC collocates and integrates key NAS components into a single environment to address emergent research questions (see Figure 1). Existing Technical Center capabilities were leveraged for initial NIEC operation. The NIEC platform will evolve as research requirements emerge.

The NIEC platform provides the infrastructure to evaluate:

- Concepts
- NextGen integration into the NAS
- NextGen system requirements
- Human and machine workload
- Common situational awareness
- Procedures for Air Traffic, Unmanned Aircraft System (UAS), pilots and/or airline operations.


Air Traffic Suite


Tower Suite

Special Features

The NIEC provides a futuristic NextGen gate-to-gate visualization environment with advanced data collection capabilities to support integration and evaluation of new technologies and concepts. The ability to provide a combined environment of legacy systems with future capabilities also enables the NIEC to support the transition to NextGen. The base components featured in Figure 1 are an Air Traffic Suite, a Cockpit Simulator, a UAS Suite, a Tower Suite, and a multi-purpose area. The multi-purpose area is used to display weather data, traffic management data, operate as a simulation monitoring station and as an airline operations center. Each of these NIEC components mirrors key areas in the NAS "Gate-to-Gate" spectrum.

Integrated NAS Systems include:

- Time Based Flow Management
- Traffic Flow Management System
- Common Support Services - Weather
- System Wide Information Management
- ERAM Evaluation System
- Live and simulated ADS-B data

The Distributed Environment for Simulation, Rapid Engineering and Experimentation (DESIREE) and the Target Generation Facility (TGF) are simulation engines that are key in conducting NIEC simulations. The TGF is a crosscutting infrastructure that drives Terminal, En Route as well as other research laboratories. DESIREE and the TGF work together to immerse the subject into a realistic environment that can emulate the present or future air traffic environments. DESIREE uses TGF generated position and track data to display the targets onto Tower, Terminal, En Route, Airline Operations Center (AOC), and Traffic Management Unit (TMU) displays. DESIREE can prototype any display system required by the customer including Electronic Flight Bags (EFB) and Cockpit Display of Traffic Information (CDTI).

The NIEC has a Research and Development Traffic Flow Management (TFM) Auxiliary Platform (TAP) which allows a common operational picture to be displayed to Tower, Terminal, En Route, AOC, and TMU environments. This allows for true NAS-wide end to end simulations and increased situational awareness for simulations. The R & D TAP includes the strategic traffic situation display (TSD) and the associated traffic management tools which enables simulations requiring either command center functionality and/or the additional TMU capabilities that the TFM system supports.

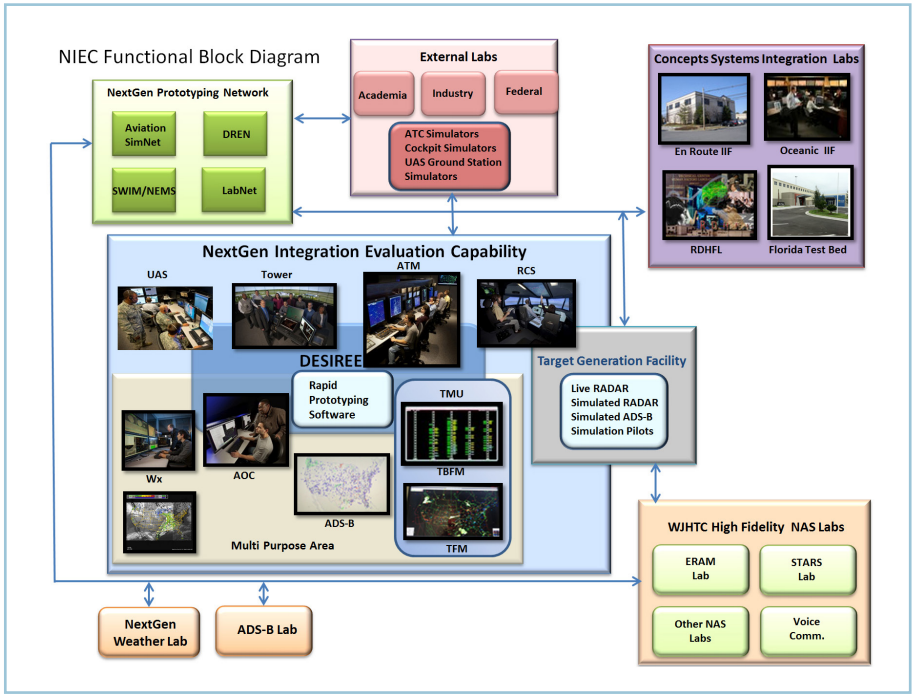


Figure 2, the NIEC Functional Block Diagram, shows the building blocks of the NIEC. The light blue area features the NIEC's core capabilities. The tan area represents the NIEC's multi-purpose area, which has live data feeds (ADS-B, TFM, and weather) and a research TMU (TBFM and TFM). The medium blue area represents DESIREE. The green area represents the NextGen Prototyping Network (NPN) which connects to external facilities and networks such as Defense Research and Engineering Network (DREN) and SWIM's NAS Enterprise Messaging Service. The pink area provides some of the external facilities that the NIEC can connect to via NPN. The purple area highlights the CSI R & D labs. The orange area showcases some of the internal Technical Center labs that the NIEC is connected with. The gray area highlights the TGF simulation capabilities for aircraft, pilots, radar, and Automatic Dependent Surveillance – Broadcast (ADS-B).

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