NextGen Air Traffic Control/Tech Ops Human Factors – Fall 2013 Review

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July 31, 2013

BLI Portfolio Overview

- Purpose of the BLI portfolio
  - Improve NAS efficiency and capacity by improving human performance in the NextGen environment
  - Addresses NextGen Human Factors issues that cross programs by development of common methods and shared technical studies

- Benefits to the FAA
  - Lower acquisition and lifecycle cost for NextGen systems
  - Reduced safety risk due to proactive human hazard assessment
  - Greater NAS uptime due to advanced maintenance environment, tools, and training procedures.

- Program Success Demonstrated by:
  - Integrated functional and information requirements supporting AMS lifecycle
  - Testable metrics available to measure improved NAS performance

- Technical Sponsors
  - ATO, Safety and Technical Training and Program Management Office
  - ANG Chief Scientist and Lifecycle Integration Office

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NextGen Air Traffic Control/Technical Operations Human Factors Facilities & Equipment (F&E) Program

Need

Identify changes in the task performance, knowledge, and skills of NAS actors as a result of NextGen technologies and procedures

Assure human factors integration as the current work environment transitions to NextGen technologies

Assess human performance and safety of NextGen changes

Research Goals

Provide guidance on strategic ATC training needs

Reduce safety risk in the NAS related to human performance in ATC

Provide human factors requirements for NextGen Decision Support Tools

Align how technologies change jobs of aviation actors via Human System Integration (HSI) Roadmap

FY 2013 Accomplishments

Air/Ground Integration Simulation Results

Develop tool to identify NextGen Human Performance impacts

Complete updates to NextGen Job Task Analysis for technical operations specialists and identify Tech Ops systems information requirements

Deliver analyses of the impact of Segment Bravo NextGen tools on human performance related to safety

Out Year Funding Requirements

FY13	FY14	FY15	FY16	FY17
*$5,000K	$5,000K	$5,370K	$5,920K	$6,000K

Per the FY2015 RPD, contracts only

* PLA Target $3,900K

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NextGen ATC/Technical Operations Human Factors

	FY 2013	FY 2014	FY 2015	FY 2016
Human Performance and Safety Assessment, Segments B&C	◆	◆	◆	◆
RNAV/RNP Non-Conformance Mitigation		◆	◆	
En Route/TRACON Merger	◆	◆	◆	
Human System Integration Roadmap	◆	◆	◆	◆
Air/Ground Integration Studies	◆	◆	◆	◆
Controller Training Guidance, Segments B&C	◆	◆		
Unmanned Aircraft Systems	◆	◆	◆	◆
Technical Operations Training Integrated Work Environment	◆	◆	◆	◆

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Program Outputs

- Provide strategic <u>training</u> guidance addressing needs of ATC and Technical Operations communities

- Provide Program Management Organization (PMO) with cross-system controller <u>functional and information requirements</u>, and provide feedback to concept development groups on:

  - Automation Interaction

  - Human Performance Requirements

  - Adverse Event Recovery Procedures

- Predict <u>safety</u> levels and provide mitigations

- Align Human System Integration (HSI) Roadmap products with I2I process and individual system development

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Focal Areas

FY13-14

- Human Performance Hazard Identification and Tracking

- Update of Controller Job Task Analysis and Training Needs Analysis

- NextGen Technical Operations Job Task Analysis

- Update of Human System Integration (HSI) Roadmap

- Role of the controller in NextGen Automation and Decision Support Tools

- Air/Ground Integration Human-In-The-Loop (HITL) Simulation

Emerging Requirement

- En Route and TRACON Strategic Plan for implementing common functions and information requirements

NextGen Safety

Research Requirement

Identify human performance safety risks for NextGen Operational Improvement to manage the human performance risks in the National Airspace System

Develop safety risk mitigation requirements to manage human performance risks associated with NextGen implementation

Sponsor: ATO Safety Office

Outcome

Manage human performance risks in partnership with ATO Safety through mitigation during the early stages of concept development

Maintain the required level of NAS safety by developing the human component to SMS safety risk management related to NextGen Operational Improvements

Outputs

Prioritized mitigation strategies related to specific NextGen scenarios and Operational Improvements

Human performance hazard baseline risk assessment of the controller tasks which introduce the highest proportion of relative risks in the NextGen midterm

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	$500	$500	$250	$250	$500

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NextGen En Route and TRACON Common Functions and Information Requirements

Research Requirement

Great cost savings and improved safety can be achieved by strategic implementation of common En Route and TRACON tasks and tools

Inform tool development and NAS strategic implementation of NextGen tools and functions with the goal of reaching a common look and feel across common tasks in the En Route and TRACON domains

Sponsor: Chief Scientist

Outcome

This work establishes common functions and tasks as opportunities to implement a common look and feel with the above strategic objective in mind

Deliverables detail areas of opportunity, potential risks, and provide context for an implementation strategy supporting an evolution of these systems over time

Outputs

The output is a strategic plan for the analysis and roll out of common elements between the two systems

The report details functions and tasks that are common to both domains, similar or overlapping tasks that are not identical, and tasks that are absolutely different. These distinctions provide the context for not only what *is* common but what *should* be common

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	**$500**	**$500**	**$500**		

En Route and TRACON Common Information Requirements

Identify Points of Commonality

- Examine inter-dependencies and other similarities in functions/tasks and information requirements for both En Route and TRACON controllers
- Review existing relevant Human Factors research on what functions and information could or should not be made common

Identify Opportunities for Evolution

- Review the schedule for software updates for the two systems.
- Identify when updated are expected that could be leveraged to implement common functions and information requirements

Develop Strategic Plan For Evolution

- Determine when the common functions should be updated to best support the move to commonality from a human performance perspective
- Provide a strategic plan and approach

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Technical Operations Training and Integrated Workstation Environment (IWE)

Research Requirement

Provide a longer term understanding of the planned implementation of NextGen concepts with regard to technical operations workstation design and use

Generate HF Operational and Functional requirements for NextGen in the maintenance domain

Stakeholders: Technical Operations Service

Outcome

Provide HF requirements to technical operations service unit to provide a longer term picture of the future maintenance workstations

Requirements are designed to reduce risk of short term decision making (conflicting & competing design/implementation)

Used to inform Implementation Strategy (sequence, impact, timings etc)

Outputs

Update of IWE requirements and analysis from FY11-14 against current NextGen rollout plan

Collaboration with PMO to develop implementation strategy

Concept of use for NextGen maintenance workstations

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	$800	$625	$250	$200	$400

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NextGen Controller Strategic Training Analyses

Research Requirement

Builds upon previous research
Revises list of NextGen Drivers to take into account recent changes, allowing for a more complete picture of the NextGen work environment in the Mid-Term.
Evaluates the impact of these changes on the ATCS job as it is performed in ATCTs, TRACONs, and ARTCCs
Sponsor: ATO Training Office

Outcome

Required to update estimations of if and how the pre-employment selection test battery needs to change
Required to update estimations of if and how the ATCS training program needs to change

Outputs

Results in job descriptions that explain what the ATCS job will look like in the Mid-Term as well as several training products including training plans, requirements, and algorithms that can be used to estimate the resources required to support the new training

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	$650	$325			$500

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Performance Based Navigation RNAV/RNP Barriers to Implementation

Research Requirement

Identify and describe the human performance impact of the introduction of NextGen RNAV/RNP procedures and technology in case of non conformance

Initial work will focus on Time Based Metering, Optimized Profile Descent, Increase Capacity and Efficiency Using RNAV and RNP

Primary Sponsors and Stakeholders: NextGen Chief Scientist; ATO En Route and Terminal Services

Outcome

Reduce the potential for loss of separation during RNAV/RNP procedures particularly in terminal

Enhance the probability of successful execution of RNAV/RNP procedures under normal and off-nominal conditions

Assure that controllers can successfully intervene in cases of non conformance

Outputs

Assess RNAV/RNP OIs using operational data, subject matter expert input, & human factors safety tools to address non-conformance causal factors on human performance

Generate targeted mitigation strategies including functional requirements to support OI development, human performance criteria and scenarios to support testing and implementation

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)		$600	$400		

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UAS Ground Movement, Contingency Ops, and Incident Reporting

Research Requirement

Speed integration of UAS in the NAS in response to congressional mandate.

Ensure NextGen systems support UAS integration.

Generate HF Operational and Functional requirements for NextGen systems to support imminent UAS NAS integration

Stakeholders: UAS Program Office

Outcome

Provide HF for Ground Control Systems,

Provide UAS equipage for visual compliance,

Provide recommended modifications to controller incident reporting systems,

Provide recommended revisions to existing controller contingency procedures in response to UAS failure/degraded modes

Outputs

Report: "UAS Visual Compliance with ATC Ground Clearances"

Report: "UAS En Route Contingency Operations"

Report: "UAS Safety Event Human Factors Guidelines and Recommendations"

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	$1,400*	$1,500*	$650	$400	$400

*Effort may be partially performed by other significantly related work within NextGen HF portfolio

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NextGen HSI Roadmap and Strategic Planning

Research Requirement

Develop HSI Roadmap for NextGen
Enterprise Architecture
Develop NextGen HF Strategic Plan
Sponsor: NextGen Chief Scientist and
ATO Program Management
Organization

Outcome

Support the NAS Enterprise
Architecture with the HSI roadmap
to represent the human element in
the EA
Provide longer range vision for HF in
NextGen evolution for the
NextGen office

Outputs

HSI Roadmap in the NAS EA
NextGen HF Strategic Plan revisions

Out Year Funding Requirements

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Funding Target ($000)	**$500**	**$500**	**$500**	**$500**	**$500**

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Human System Integration (HSI) Roadmap

- HSI Roadmap conveys the evolution NAS Actors with NextGen in the NAS Enterprise Architecture (EA)

- HSI Roadmap supports the annual plans for maturing the Enterprise Architecture

- Main goal for FY13: Enhance dependencies between HSI Roadmap and NAS EA decision points/decision authorities

- Revisions to HSI Roadmap representations to reflect the evolutionary "story" of the workforce and their work environment

- Explore means to populate the NAS EA artifacts (e.g., Operational Views) with human performance related information

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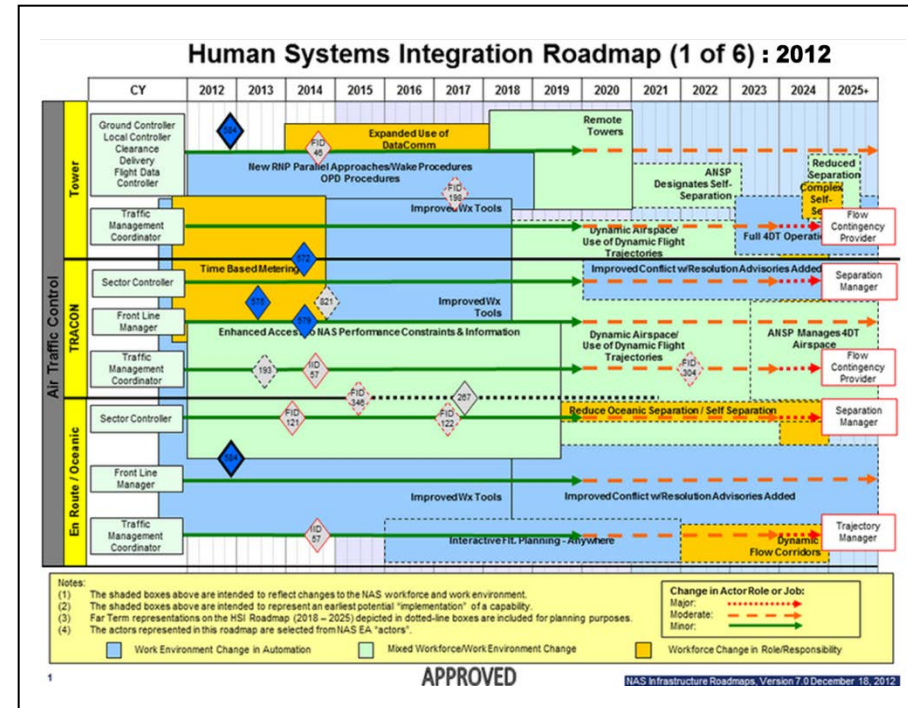
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Summary

- NextGen technology is bringing many incremental changes to controllers and maintainers

- HF/Safety effort is bridging new alliances

- Human System Integration (HSI) approach assures that functional and information requirements are part of acquisition documents

- Our program uniquely addresses Human Factors issues that cross programs by development of common methods and shared technical studies

Questions?

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