Research to Ops
Conceptual Framework

Presented to:  FPAW
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Issue

- AWTT process needed to evolve to meet requirements of the FAA’s Acquisition Management System

- A clear, unambiguous process needed for transitioning research to operations
RTO Coordinator Goals

- Facilitate movement of research into operations efficiently and effectively by *creating* and then managing an RTO process that delivers products which:
  - Have traceability to operational requirements,
  - Provide demonstrable enhancement to aviation safety and traffic flow efficiency
  - And are operationally/technically suitable and sustainable

- Facilitate programmatic activities for product entry to, management within, and exit from the NextGen Weather Evaluation Capability (NWEC)
Research to Operations Process

NextGen R&D Requirements

R&D Activities

Evaluation Activities
- Human Factors
- Safety
- Operations
- Operational
- Technical

FAA R&D Prioritization

Research to Operations Conceptual Framework
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Research to Operations Process

- NextGen Requirements
- Roadmap
- Research Management Plan
- CONUSE
- RE&D and Other Activities
  - NWEC Evaluation Activities
    - Technical
    - Safety
    - Operational
  - HF
- AMS Cycle
  - IARD
  - IIA
  - FIA
- Deployment
- NAS

- MNS
- EA
- FA
- Wx PPT
- JPDO
- JPDO
RTO Process: AWRP to NWS Platform

- RE&D and Other Activities
  - Evaluation Activities
    - Technical
    - Safety
    - Operational
  - NOAA Acquisition Process
    - OSIP
    - PPBES

- MNS
- EA
- FA
- Wx PPT
- JPDO
- CONUSE
- Roadmap
- Research Management Plan

- Deployment
- NWS
NextGen Weather Evaluation Capability

• NWEC evaluates product suitability for NAS deployment by evaluating that:
  – Algorithm is technically sound and meets HF, safety and operational suitability standards
  – Targeted user requirements are met and expected NAS benefits are substantiated
  – Software/system conforms with NAS EA standards
  – Product will be operable and maintainable over its life cycle
NWEC Activities

• Spiral Evaluation Approach – Iterative, incremental development and testing which allows for:
  – Product refinement and re-evaluation
  – Movement between evaluation and RE&D / AMS

• Evaluations tailored to candidate product
  – Research Evaluation Plan ensures requirements traceability, defines test methodology and validates completion of entrance criteria
NWEC Activities (cont’d)

• **Technical Evaluation:**
  – Verifies that the product performs within established performance requirements
  – Ensures software code is functionally equivalent – the code works as expected when transferred from the Lab to an operational platform (i.e., burn-in-time)
  – Ensures software is reliable and maintainable and is delivered with documentation and standard interfaces
NWEC Activities (cont’d)

• **Safety / Human Factors Evaluation:**
  – Safety – systematically assesses safety risk of a product in the NAS (e.g., Preliminary Hazard Analysis) in accordance with the FAA Safety Management System (SMS)
  – Human Factors – ensures product is consistent with human capabilities and limitations – will perform safely and effectively
    • HF analysis considers the implications for the specific user group(s) identified in the ConUse in the context of all relevant factors
    • HF considerations include, but are not limited to, workload, computer-human interface, information presentation, documentation, functional design, error potential and recovery, information requirements, procedures, situation awareness
NWEC Activities (cont’d)

• **Operational Evaluation:**
  – Systematically assesses the product in an operational or near operational (simulated) environment
    • Assess operational suitability and feasibility
    • Assess impact of product on users’ decisions/performance
    • Collect technical data and obtain user feedback
  – Operational analysis is linked to the ConUse
NWEC Activities (cont’d)

• NWEC results form the basis for technical and performance reporting to the AMS
  – Basis for financial and costing calculations
  – And business case/investment analysis

• NWEC results also provide validation for operational deployment decisions

• All products destined for NAS deployment will undergo NWEC (or NWEC-sanctioned) evaluation
RTO Coordinator and NWEC

- RTO Coordinator will provide decision support to a management board for product entrance, movement, and exit from NWEC
  - RMP will document NWEC activities and results to support product status and movement recommendation

- RTO Coordinator will facilitate NWEC spiral development and feedback looping
  - Conduit for feedback between requirements development, RE&D, evaluation and deployment
  - Conduit for RE&D involvement in response to evaluation when product adjustment is needed
NWEC Entrance Criteria
NWEC Entrance Criteria

• Candidate product must have a ConUse traceable to requirements with:
  – Scientific, technical and operational description
  – Identification of target users
  – Decisions users are expected to make using product
  – Expectation for product use for decision-making
  – Description of how users will access product (display and/or interface method)
    • Include operational use cases with narrative scenarios
Entrance Criteria (con’t)

• **Candidate product must:**
  – Be consistent with weather roadmaps and NAS architecture
  – Fit NAS infrastructure and capabilities evolution
  – Be considered ready to meet functional and performance requirements
Entrance Criteria (con’t)

• Preliminary Scientific Testing (from AWRP)
  – Does candidate algorithm accurately depict the current or forecast state of the atmosphere

• Verification report that includes:
  – Goal of the evaluation
  – Linkage to requirements/ConUse
  – Participants and methodology
  – Detailed scientific results and issues
  – Conclusions/Recommendations
Other Entrance Criteria (con’t)

• **Assess evaluation candidate against investment analysis/management criteria**
  – Potential budget, resource and life cycle cost implications of continuing to implementation
  – Benefits in terms of Flight Plan and SMP Goals
  – Risks assessed and mitigation plans available for medium or high risks
  – Schedule impact and risks; viability against NextGen Master Plan and Roadmaps

• **Identify shortfalls in meeting requirements**
Other Entrance Criteria (con’t)

• **Algorithm documentation**
  – Algorithm Description - theory of the science, limitations, dependencies
  – Computations and subroutines
  – Outputs

• **Software Documentation**
  – Software requirements and performance
  – Software Structure
  – Outputs
  – Testing requirements and methods
Roles and Responsibilities
Responsibilities: New Weather Capabilities Manager

- **Leads NWEC process:**
  - Formal acceptance that NWEC entrance criteria met
  - Formal approval of the initial Research Management Plan
  - Formal approval of NWEC outputs after subject matter expert review of evaluation results
  - Formal approval for product to move into AMS
Responsibilities: RTO Coordinator

• Develops Research Management Plans and coordinates RTO process
  – Assesses candidate product’s readiness to proceed to formal evaluation
  – Recommends to the New Weather Capabilities Manager that candidate products meet NWEC entrance/exit criteria
  – Identifies/coordinates with subject matter experts for review of product evaluations
  – Ensures consistency and traceability of products to ConUse, roadmaps, and requirements
  – Ensures configuration management
  – Ensures preparation of meeting minutes
Responsibilities: Subject Matter Experts

• **Subject Matter Experts:**
  – Maintain independence (not responsible for managing product through the NWEC process)
  – Provide inputs for requirements, ConUse and Research Management Plan and review as appropriate
  – Review weather product evaluations and provide recommendations
Responsibilities: Weather Product Approval Board

- Approval of weather products to send to NWS for investment decision and subsequent implementation on NWS platform

- Structure:
  - Director, Aviation Weather Group (Chair)
  - ATO service unit representative
  - AVS
  - NWS
  - RTO Coordinator (Sec’y, non-voting)
Responsibilities: Weather Product Approval Board (cont’d)

• **Operating Processes**
  – Members responsible for coordination with their respective organizations
  – Meet semi-annually or as needed
  – Decisions made by consensus