

Headquarters U.S. Air Force

Integrity - Service - Excellence

Digital Airworthiness Team



November 2022

**Noah “Odie” Demerly
Process Automation Lead
Digital Transformation Office (DTO)
HQ AFMC/ENSZ, WPAFB, OH
Noah.demerly.3@us.af.mil**

U.S. AIR FORCE

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029



Background

U.S. AIR FORCE

- Digital airworthiness certification is a key enabler to field the latest technologies faster than our adversaries, thus SAF/AQR and AFMC/EN endorsed a grass-roots effort and AF Digital Campaign made Digital Airworthiness an early focus
- No single organization has the resources or authority to overhaul the airworthiness process, and no overarching construct exists for coordinating, communicating, or prioritizing disparate efforts
- A Digital Airworthiness Team is the mechanism to coordinate and communicate ongoing activities; provide strategic vision/direction on the implementation of digital methods, processes, and tools; and provide prioritized guidance and recommendations on current and future efforts
- The Digital Airworthiness Team has received continued endorsement & input from the Air Force Airworthiness Management Steering Group (AMSG), Technical Airworthiness Authority (TAA) & AF Airworthiness Office (AFLCMC/EZZ)

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Overview

U.S. AIR FORCE

- Formal kick-off (50+ participants) and AA&S conference engaged stakeholders to increase awareness, explain the Team's approach, and participation in workshops
- Completed 4 rounds of workshops with 80+ participants across 5 diverse stakeholder groups
 - System Program Offices (SPOs)
 - Airworthiness Home office (AFLCMC/EN-EZ)
 - AFRL / AFTC
 - CE / DOE Designated Technical Authorities (DTAs)
 - Industry (limited audience/scope)
- Results from the workshops fed the creation of the Digital Airworthiness Roadmap
- Sought feedback from Industry and Sister Services at AA&S 2022 on Digital Airworthiness Roadmap and strategic approach going forward
- We had 140+ participants from USAF/Academia/other Gov't agencies/Industry respond and participate in 6 short-term working groups
 - Currently Working Groups are stood up & are working on formulating charters/success criteria/battle rhythms



Core Team & SMEs

U.S. AIR FORCE

■ **Core Team Members:**

- Mr. Noah Demerly, HQ AFMC/ENSZ (Process Automation, DTO) – Chairperson
- Mr. Joe Baker, AFLCMC/EZ (Deputy TAA) – Lead
- Mr. Stephen Falcone, AFLCMC/HB (Director of Engineering)
- Ms. Rachel Sharp, AFRL/EZZ (Airworthiness SME)
- Mr. Michael Larsen, AFLCMC/WAQ (Chief Engineer, FMS)
- Ms. Stephanie Lohn, AFLCMC/WAM (Lead Engineer)
- Ms. Alicia Janszen, AFLCMC/EZZ (AW Technical Expert)
- Mr. Matt Dillsaver, AFLCMC/EZZ (UAS Technical Expert)
- Mr. David Diaz, HQ AFMC/ENSZ (Chief Architect, DTO)
- Ms. Christen Walden, HQ AFMC/ENSZ (Digital Twin & Digital Thread Lead, DTO)
- Dr. Pam Kobryn, AFRL/RQS (AFRL Digital SME)
- Dr. Steven Turek, HQ AFMC/ENSZ (Technical Director, DTO)

■ **SME Support:**

- Dr. Rollie Dutton (ARCTOS)
- Ms. Dawn McGarvey-Buchwalder (DAI)
- Ms. Betty Rodriguez (DAI)
- Mr. Bob Stanton (DAI)
- Mr. Tim Strange (WBI)

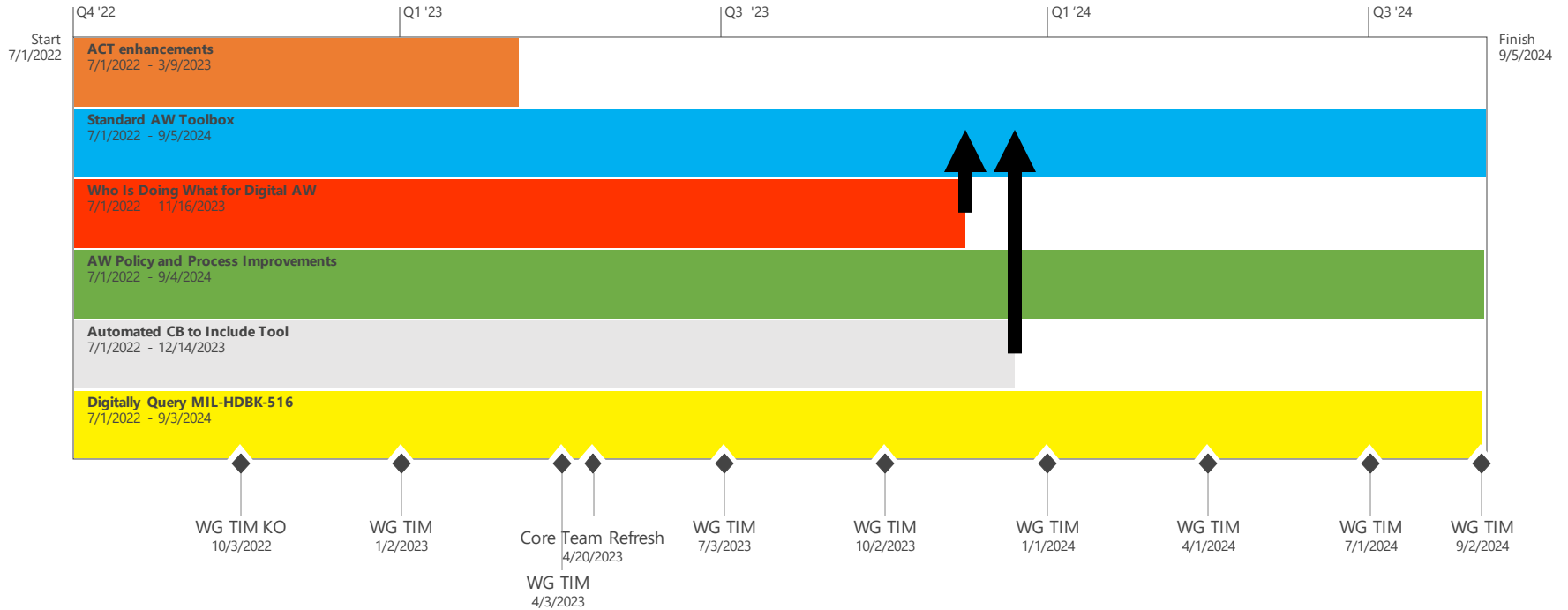
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Digital Airworthiness Roadmap Short Term

U.S. AIR FORCE



ACT – Airworthiness Certification Tool
 CB – Certification Basis
 KO – Kick-Off
 TIM – Technical Interchange Meeting
 WG – Working Group

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

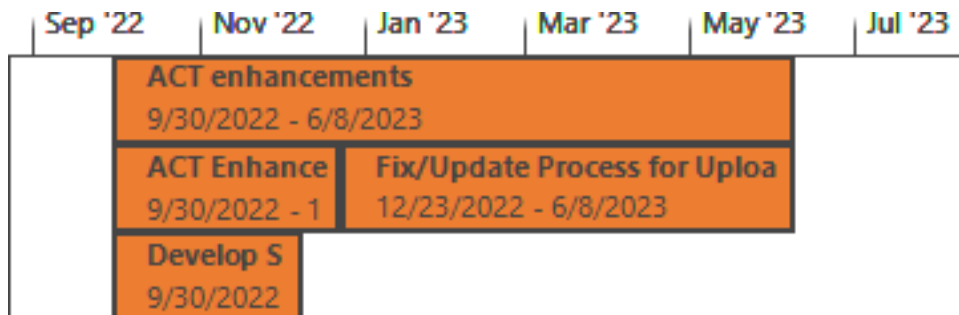
Integrity – Service – Excellence



ACT Enhancements

U.S. AIR FORCE

- Validation of hyperlinking documents to projects in ACT
- Fix/update process for uploading artifacts
 - Mandating of hyperlinks
 - Automatic artifact library linkages to CR
- Develop snapshot view for PO for faster/more efficient review of criteria



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

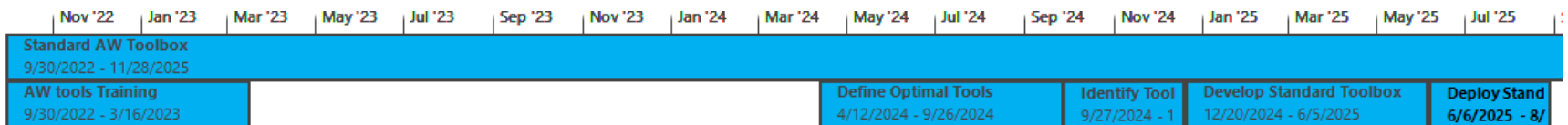
Integrity – Service – Excellence



Standard AW Toolbox

U.S. AIR FORCE

- Training/Re-rollout of AW tools that are currently available (ACT, C-130 tool, etc.)
- Define optimal tools (inputs from “Who’s Doing What for Digital AW” and “Automated CB” working groups)
- Identify Tool Gaps
 - Identify long term research/development
- Develop Standard Airworthiness toolbox (to address short-term gaps)
- Deploy Standard AW toolbox (to address short-term gaps)
- Split into Short-Term / Long-Term Working Groups



Who's doing what WG
↓

↑
Auto CB WG

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Who's doing what in Digital AW

U.S. AIR FORCE

- Look at various groups across the Airworthiness Community and see what's currently out there
 - Sister Services / SPO's / Industry / Test and Evaluation / AFRL / Other Agencies (FAA, NASA, etc.)
 - Each group has an "off-ramp" for identifying tech transfers to the AW community
- While gathering data, look at gaps/workforce capabilities or skills in need
- Split into Internally Focused / Externally Focused Working Groups

	Sep '22	Nov '22	Jan '23	Mar '23	May '23	Jul '23	Sep '23	Nov '23	Jan '24	Mar '24	May '24	Jul '24
Who is doing what for DAW	9/30/2022 - 4/11/2024											
Sister Services	9/30/2022 - 2/15/2024										Identify	2/16/20
SPO	9/30/2022 - 2/15/2024										Identify	2/16/20
Industry	9/30/2022 - 2/15/2024										Identify	2/16/20
T&E	9/30/2022 - 2/15/2024										Identify	2/16/20
AFRL	9/30/2022 - 2/15/2024										Identify	2/16/20
Other Agencies (FAA / NASA / etc.)	9/30/2022 - 2/15/2024										Master	2/16/20
Workforce Capabilities needed	9/30/2022 - 2/15/2024											

DISSEMINATION STATEMENT: Approved for public release; distribution is unlimited. F7A00007-1-00000-0000-0000-0000-0000



AW Policy and Process Improvements

U.S. AIR FORCE

- Complete a best practices sprint with a cross-cutting team to look for efficiency gains across the community
- Verify user input for process improvements
- Use case story and persona gathering
 - Value stream map the AW process
- Provide a report out of recommendations to Air Force Instructions/Policies/Directives
- Implement policy improvements



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Auto Certification Basis

U.S. AIR FORCE

- Automated CB is to assist generation of a CB for both applicable criteria and tailored MOCs (properly scoped and recognized alternatives), based on the system/modification description
- Persona Gathering / Requirements
- Develop Tool Acquisition Strategy
 - Sprints / Agile Development
 - Tool Deployment (Minimum Viable Product)

Sep '22	Nov '22	Jan '23	Mar '23	May '23	Jul '23	Sep '23	Nov '23	Jan '24	Mar '24	May '24
Auto CB to include Tool 9/30/2022 - 3/15/2024										
Persona Gath 9/30/2022 - 1	Develo 12/23/2	Sprint 1 2/17/20	Sprint 2 4/14/20	Sprint 3 6/9/202	Tool Deployment (MVP) 8/4/2023 - 3/14/2024					

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

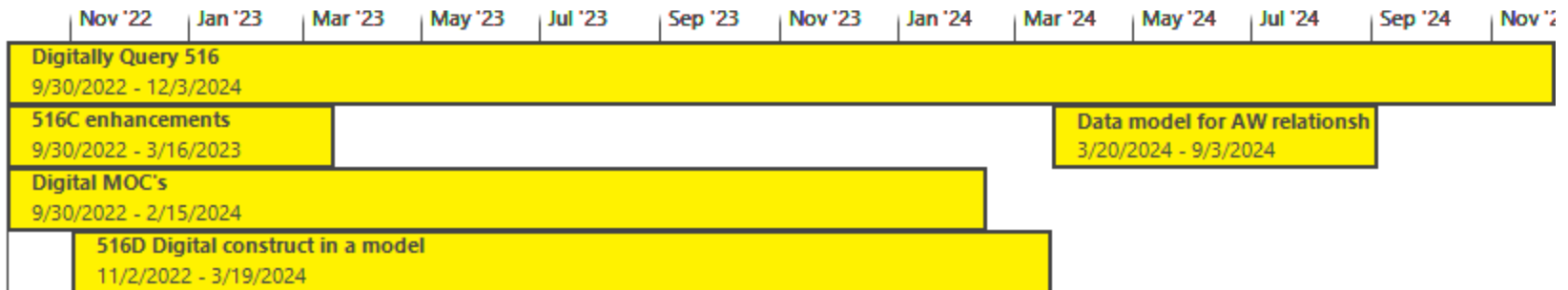
Integrity – Service – Excellence



Digitally Query 516

U.S. AIR FORCE

- MIL-HDBK-516C enhancements (e.g. grouping of similar criteria across sections)
- Lists of common queries for MIL-HDBK-516
- Digital Method's of Compliance (start researching how this might work in the future)
- MIL-HDBK-516D Digital Construct in a model
- Start to develop a Data Model for AW relationships based on MIL-HDBK-516D construct
- Split into 516C / 516D Working Groups



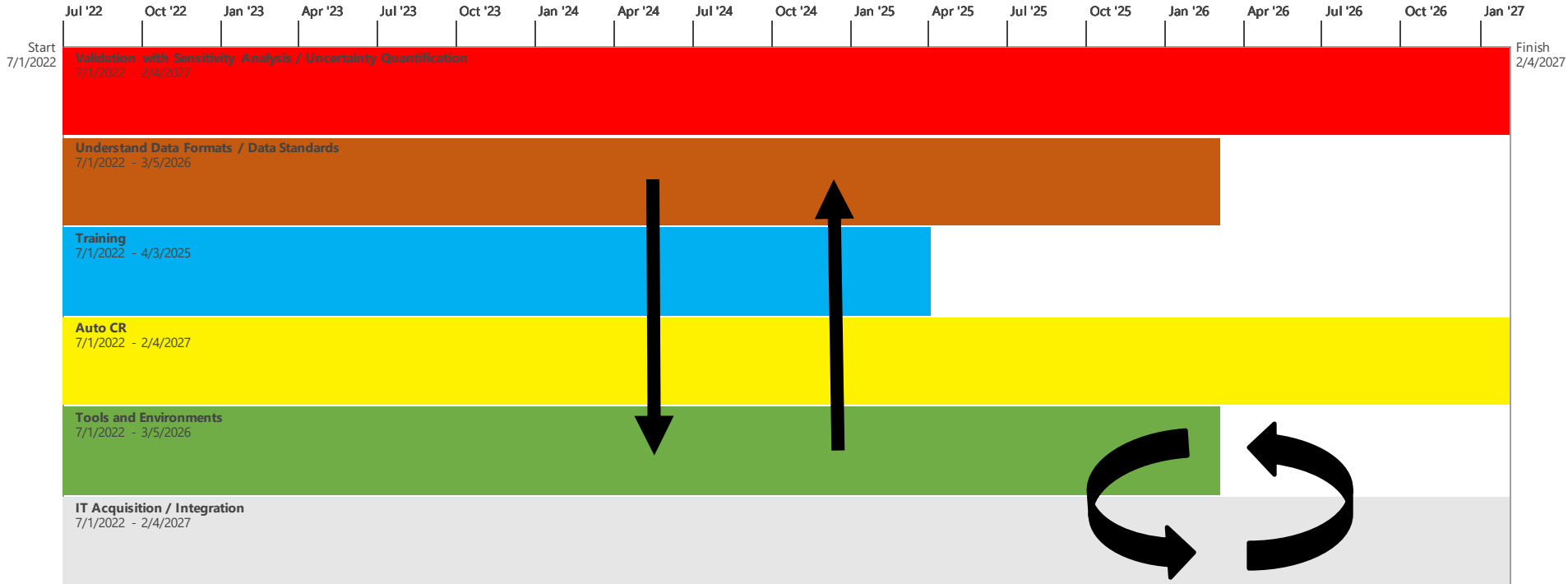
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Digital Airworthiness Roadmap Long Term

U.S. AIR FORCE



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Long Term Road mapping WGs

U.S. AIR FORCE

- **Validation with Sensitivity Analysis / Uncertainty Quantification**
 - **Developing tools/technologies to understand model limitations / accuracy**
- **Understand Data Formats/Data Standards**
 - **Defining list of data formats for artifacts (interoperable with standard AW tools)**
 - **Must interface with Tools working group**
- **Training**
 - **Developing training for AW toolbox (short & long term), policies, and MIL-HDBK-516 digital improvements**
- **Automated Compliance Report (CR)**
 - **Develop algorithms / visualizations for computer-assisted assessments**
- **Tools**
 - **Creating a long-term digital AW toolbox**
 - **Must interface with Data Formats/Data Standards working group**
- **IT Acquisition / Integration**
 - **Interfaces with AFMC Digital Campaign LOE 0/1 and the Digital AW Tools working group**
 - **Ensures Digital AW IT requirements are met**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



U.S. AIR FORCE

Questions?

- **Our Digital Guide APAN website:**
<https://wss.apan.org/af/aflcmc/Digital%20Airworthiness%20Team/Home.aspx>
- **You must register for an APAN account and will then be granted access to the site**



U.S. AIR FORCE



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited. PA Case AFMC-2022-0029

Integrity – Service – Excellence



Approach

U.S. AIR FORCE

- Contract Airworthiness SMEs to gather and synthesize information regarding airworthiness policy, standards, and guidance; current state of the art/state of practice; create an 'Airworthiness 101' briefing
- Create and synthesize recent success stories and lessons learned from prior digital transformation activities; ongoing digital transformation activities; and opportunities, gaps, and challenges
- Engage Wright Brothers Institute to assemble and facilitate stakeholder workshops
 - Jun-Sep 2021: Problem Deconstruction (8-10 mini-workshops)
 - Sep-Oct 2021: Future State Ideation (4-5 mini-workshops)
 - Oct-Nov 2021: Action Ideation, Prioritization, Development (1 workshop & follow-up activities)
- Report summarizing the findings, including recommended strategic and tactical next steps
- Construct detailed roadmap covering 1-5 years which addresses the identified opportunities, gaps, and challenges; present to AMSG and incorporate feedback
- Continuously communicate progress of ongoing digital airworthiness activities and interim/final results; engage with industry through workshops, professional societies, industry groups, and conferences