

NASA Advisory Council Aeronautics Committee Meeting
29-30 November 2023
NASA Glenn Research Center
Building 162 Room 302
Cleveland, Ohio

Welcome

Dr. John-Paul Clarke, committee chair, called the meeting to order. Introductions were made and information regarding the purpose and scope of the Committee's discussions, findings, and recommendations were described. This meeting was conducted in a hybrid style, with some attending in person at NASA's Glenn Research Center in Cleveland and others attending virtually.

Glenn Introduction and Facilities Overview

Mr. Timothy McCartney, director for aeronautics at NASA Glenn, gave a comprehensive overview of the center's aeronautics research portfolio, funding, facilities, and activities – including propulsion research, materials research, wind tunnels, infrastructure, community engagement, and more.

Discussion

Dr. Clarke brought up scheduled maintenance for Glenn facilities with particular focus on the deferred maintenance backlog, and how decisions are made on which facilities or infrastructure to prioritize.

Mr. McCartney responded that Glenn works closely with the Aerosciences Evaluation and Test Capabilities (AETC) portfolio, which manages NASA's wind tunnels and other facilities, to align priorities and ensure facilities are maintained using funds from either/both the Glenn and AETC budgets. He mentioned there have been instances where a proposed task cannot be executed due to a funding issue.

Dr. Clarke followed up asking whether these instances are being recorded in a ledger of sorts, so that managers can observe metrics and trends that track how much and how often programs and projects' work are affected by maintenance funding issues.

Mr. Ron Colantonio, director of AETC, responded that AETC is digitally gathering real-time data on the deferred maintenance backlog, and that metrics including reliability and timeliness have been measured now for more than a year.

ARMD Report Back on 2022 Findings & Recommendations

Mr. Robert Pearce, associate administrator for NASA Aeronautics, introduced a new topic for presentation to the Committee – a report back from ARMD’s managers on how NASA has responded to each of the findings and recommendations the Committee presented during 2022.

The directors of each of ARMD’s four programs and of the AETC portfolio each gave an overview of how the Committee’s insights affected their programs’ activities.

Mr. Nateri Madavan, director of the Advanced Air Vehicles Program, mentioned the Committee’s prior suggestion of a digital thread during 2022 and how his program had taken steps to construct a framework for model-based systems engineering for the Sustainable Flight National Partnership.

Mr. Colantonio explained how the deferred maintenance backlog for AETC has been trending downward during the past few years, with the list of facilities in need of repair decreasing. He also discussed details of the funding process and organization structure behind it.

Discussion

Dr. Clarke asked whether NASA had any plans for a digital thread, and that NASA has the capability of developing it. He postulated on how to structure this to be beneficial overall in terms of the modelling exercise, as well as to the FAA or others involved in the process.

Mr. Madavan responded that industry stakeholders or partners would likely maintain some level of privacy with this concept. Though, NASA had already been able to explore system-level benefits with regards to one of its projects and was able to communicate with a partner about these results relatively effectively. He mentioned NASA would continue to evolve and improve in this area and share amongst NASA’s community.

Finding:

1. The Committee is pleased to see the declining backlog of deferred maintenance for facilities in the Aerosciences Evaluation and Test Capabilities portfolio, as maintaining infrastructure is central to sustaining NASA’s flight research. The Committee is also pleased there is real-time data collection on the reliability and operational status of each facility.

2. The Committee commends ARMD for its effort to report back to the Committee with results and further developments stemming from prior findings and recommendations.

Verification and Validation for Complex Systems

Ms. Misty Davies, technical advisor for assurance and safety for the Airspace Operations and Safety program, gave an overview of the verification and validation (V&V) process for complex systems with regards to NASA's future airspace research. Her summary included explanations of specific projects' work, runtime assurance, potential mechanisms for establishing effective collaborative working groups, and more.

Discussion

Dr. Clarke returned to the subject of V&V for safety. He explained how systems are verified as reaching target levels of safety before certification or implementation, but oftentimes, not afterwards. He asked what NASA's plans were for moving beyond certification and tracking how the technology operates in real-world use.

Ms. Davies responded that NASA has been exploring this idea for some time, particularly with regards to the System-Wide Safety project, for increasingly autonomous systems. She elaborated how greater use of these systems will require a feedback loop from operations back to design that breaks down the current "throw it over the fence" safety assurance process.

Dr. Clarke added how a digital thread is a worthwhile concept for addressing this need, and combined with the V&V effort, could help NASA figure out how to harness all its capabilities across its various projects. He emphasized that as we use more dynamic systems with more autonomous decision making and autonomous machines, this subject of looking beyond certification is of huge value, and few others are addressing it.

Finding:

The Committee finds that it would be useful to reexamine the verification and validation process from time to time, with particular emphasis on better coordinating lessons learned from multiple programs and projects via a combined digital thread. Having a feedback loop ranging from development through implementation can ensure target levels of safety are achieved in real-world use of new technologies.

DEIA Initiatives

Mr. Jon Montgomery, deputy associate administrator for policy for NASA Aeronautics, gave an overview of the new Diversity, Equity, Inclusion, and Accessibility (DEIA)

initiative within ARMD. He explained the steps ARMD has taken so far to increase the scope and impact of its DEIA policy, several concepts for future steps, and fielded the Committee's advice and input.

Discussion

Dr. Clarke pointed out how, as part of a discussion surrounding recruiting and retention, the retention element is oftentimes overlooked in favor of recruiting, and that NASA could place additional focus on workforce retention.

Dr. Helen Reed concurred with Dr. Clarke and emphasized the criticality of helping people stay in aerospace and at NASA.

Dr. Clarke added how one way to achieve this is to enable workforce members, particularly underserved groups in aerospace such as women or minorities, to have a "champion" who fosters their capabilities and professional life. He and other Committee members expressed how their own champions were key to the continuation of their own careers.

Finding:

The Committee finds that placing additional focus on workforce retention would be a beneficial step in achieving ARMD's vision for its organizational culture.

Sky for All

Mr. Akbar Sultan, director of the Airspace Operations and Safety Program, gave an overview of NASA's Sky for All vision and the research being conducted for a future National Airspace System. His detailed presentation encompassed a wide range of Sky for All's work, partnerships, and future plans.

Discussion

Mr. Jay Dryer asked whether the research on security goes as far as active denial of service for communications, jamming, or spoofing, and the degree to which worst-case-scenarios are examined. Mr. Sultan responded though these subjects are being considered, being able to make determinations on how to react to them is not currently being explored today.

Dr. Clarke and Dr. Reed concurred there is a continued need to address cybersecurity concerns as we move towards federated systems, as it pertains to potential safety issues.

Dr. Clarke suggested the research plan for these new systems call for more explicitly detailed and articulated functionality requirements, with the intention of defining the performance ranges these NASA-developed tools function best under, especially since future third-party users such as the FAA or industry would have a role in developing them for their uses.

Mr. Natesh Manikoth added the nuance that these services are performance-based, and the traditional requirements that would be handed to it are not necessarily the primary output. Rather, it's the service definition, and the performance boundaries for those sets could be the key element.

Findings:

1. The Committee finds that there is a continued need to address security and cybersecurity concerns that arise as new federated systems for aviation management come into use.
2. The Committee finds that NASA should continue its focus on the beneficial definition of the services that has helped with Unmanned Aircraft Systems Traffic Management and performance-based service definitions, with an intent to understand the certification implications of the services.

ACERO

Dr. Marcus Johnson gave a presentation outlining the project formulation, research goals, and activities of the newly minted Advanced Capabilities for Emergency Response Operations (ACERO) project. His presentation included numerous updates for the Committee encompassing the broad wildland fire management challenge.

Discussion

Dr. Clarke recognized that ACERO progressed from an idea to a project with great detail, and commended Dr. Johnson for his work shepherding the effort and presenting all the partnerships with outside entities to understand their requirements. Ms. Ellman concurred.

He also emphasized a need for managing disparate, diverse stakeholder needs and capabilities, perhaps through a lens of multi-level optimization. He explained how there is a need to optimally managing the challenges of these partnerships concordantly.

Dr. Hassan Shahidi proposed there is an opportunity for synergy across the Sky for All and ACERO activities. He asked whether there is a way to encourage such synergistic technology across these architectures. Dr. Clarke concurred.

Ms. Lisa Ellman suggested ACERO consider how lessons learned from the project could be applied to other contexts not just at the end of the project, but throughout its work. She specifically suggested examples such as using larger vehicles and the regulatory challenges associated with them. Dr. Clarke concurred.

Findings:

1. The Committee commends the Advanced Capabilities for Emergency Response Operations project for its work bringing the project to fruition, and for its work partnering with external organizations. The Committee also finds, however, that the project should place greater effort into effectively organizing all the voices participating in the research to optimally manage its capabilities.
2. The Committee encourages NASA to explore methods to enable synergistic technologies and architectures for both its Sky for All vision and ACERO project.
3. The Committee finds that there is an opportunity to leverage lessons learned in wildland fire management operations context, particularly working with larger vehicles, to other Advanced Air Mobility applications and concepts not just at the end of the project, but during the research process as well.

Public Comments

A public comment period was offered as required. No public comments were received.

Conclusion

The meeting of the Committee was concluded with discussions on the timeline and plans for future meetings.

MEETING ADJOURNED

List of Attendees

Committee Members:

1. Dr. John-Paul Clarke (Chair)
2. Mr. Jay Dryer (Virtual)
3. Mr. Michael Dumais (Virtual)
4. Ms. Lisa Ellman (Virtual)
5. Dr. Nicole Key
6. Mr. Natesh Manikoth
7. Ms. Susan Pfingstler
8. Dr. Helen Reed
9. Mr. Hassan Shahidi

NASA

10. Lori Arnett
11. Kevin Arpin (USAF)
12. Kevin Burke
13. Carol Carroll
14. John CAVOLOWSKY
15. Robert Clark
16. Olivia Carte
17. Ron Colantonio
18. Misty Davies
19. Shannon Eichorn
20. Barbara Esker
21. Diana Fitzgerald (FAIMOS)
22. Starr Ginn
23. John Gould (FedWriters)
24. Kelley Hashemi
25. James Heidmann
26. Sharon Jones
27. Marcus Johnson

28. Devin Kaucher (SAIC)
29. John Koelling
30. Paul Krasa
31. Nateri Madavan
32. Samantha Magill
33. Tim McCartney
34. Jon Montgomery
35. Matt Murray (Rothe-ARES)
36. Lee Noble
37. Lisa O'Connor
38. Michael Patterson
39. Robert Pearce
40. Cheryl Quinn
41. Jesse Quinlan
42. Andrew Ramos (SAIC)
43. Trenton Ricks
44. Michael Rogers (TRACLabs)
45. Irma Rodriguez
46. Barry Sullivan
47. Akbar Sultan
48. Edgar Waggoner
49. Rich Wahls
50. Kevin Witzberger

External (Affiliation Identified if Provided)

51. Kirsten Armstrong
52. Lewis Groswald
53. Richard Rogers
54. Yoan