National Airspace System (NAS) Operations Subcommittee | MINUTES

Date: *September 5-6, 2018*
Location: *Washington, D.C. (Conference Room varies by date)*
Purpose: *Review of FY19-20 Proposed Portfolio; Provide Guidance and Recommendations; Program Deep Dives*
Facilitator: *Francisco Bermudez, Designated Federal Officer (DFO)*
Chairperson: *Leo Prusak*
Note Takers: *Sadaf Alam*
Brian Powers
Upcoming Meetings:

- *April 11, 2019, Washington, DC*

Day 1 – September 5th, 2018 (Veracity)

Review of REDAC Recommendations, Responses, and Open Actions

Presenters *Leo Prusak/Francisco Bermudez*

Summary:

The Chairperson, Mr. Prusak, opened the meeting with a review of Prior Action Items, Current Action Items, and Findings and Recommendations (F&Rs) status. The subcommittee inquired about the status of the Pathfinder program, to which Mr. Bermudez stated that the Pathfinder program activities have ended, therefore, the topic was removed from the Fall 2018 REDAC meeting agenda. The subcommittee noted that Commercial Space is following a Trajectory Based Operation (TBO) basic structure and expressed that there were still some concerns from the Winter/Spring 2018 NAS Ops meeting that they anticipate will be addressed during the meeting. The Subcommittee was informed that there was an open action item concerning the Cybersecurity Briefing; however, the presentation was delayed until the Winter/Spring 2019 NAS Ops meeting to allow for further internal FAA coordination.

Presentation Budget Briefing

Presenter *Mike Gallivan, ABP-330*

Summary:

Mr. Gallivan notified the NAS Ops Subcommittee that the FY18 FAA Research, Engineering and Development (RE&D) Budget Request was at $150M. The FY19 FAA RE&D budget was requested at $74M. The House Appropriations Committee funded the FAA at $180M whereas, the Senate Appropriations Committee funded the FAA at $191M. Mr. Gallivan reported that he expects funding to fall somewhere between the House and Senate funding marks, between $180M and $191M. He also pointed out that the Unmanned Aerial Systems (UAS) program had received an additional $5M, above the requested amounts, with a caveat that the extra funds be used for an acceleration for the safe integration of the UAS into the NAS. Mr. Gallivan informed the subcommittee that the FAA has requested $74M targets for FY20, and that the FAA

delivered a budget to Office of Secretary (OST) in June 2019. Mr. Gallivan pointed out that the FY21 RE&D budget request will also be at $74M. The FAA Reauthorization is extended until September 30, 2018, lacking further congressional action, the expectation is for another continuing resolution.

Presentation Setting the Strategic Research Landscape
Presenter *Shelley Yak, R&D Executive Director*

Summary:

Ms. Yak described that the changes to the National Aviation Research Plan (NARP) and the Annual Review (AR) process, expressing belief that the redesign will enable the FAA to more effectively leverage research activities. She stressed the need to balance both short-term and long-term research needs, with an emphasis on better identifying potential research areas as well as the gaps where research is not performed. Ms. Yak spoke about RE&D from the FAA's perspective stating that the FAA is legislatively mandated by law to perform research and development, and one of the strengths of the FAA are its partnerships and collaborations. Some examples of those collaborations are the Centers of Excellence (COEs), industry stakeholders, technology transfers, and the relationship with NASA. Ms. Yak also spoke about the ways REDAC can be leveraged to better assist the FAA for long-term funding and research work stating that the 2019 REDAC will be used to develop aviation community research and development landscapes. She noted that the FAA was going to make the first attempt at developing these landscapes, but she requested that the REDAC NAS Ops Subcommittee members provide feedback on these landscapes and identify industry research investments prior to the upcoming FY19 spring meeting. The subcommittee was impressed with the FAA's efforts in developing the landscape architecture and initiating the dialogue for establishing a collaborative strategic direction.

Presentation UAS Research Plan – NAS Ops Review Discussion
Presenter *NAS Ops Subcommittee*

Discussion – Mr. Prusak initiated the discussion by asking other Subcommittee members if they had reviewed the UAS Research Plan. Only one member, Mr. Zellweger, reviewed the material. The UAS Research Plan was introduced as a high-level roadmap that was developed with input from industry stakeholders. The research plan's activities are clearly laid out, identifying current activities and potential gaps. Subcommittee members questioned if this plan addressed any risk mitigation strategies, UAS weather research, and others. Mr. Steve Bradford, FAA, explained to the Subcommittee that the UAS Research Plan is a required document and remains a work in progress, and the FAA will continue to improve upon this document moving forward.

The Subcommittee requested additional clarification on the definition of the Segregated Airspace. Mr. Bradford explained that the Segregated Airspace definition in that the FAA can assign a certain airspace for UAS, but other aircrafts such as helicopters may also utilize this airspace at times. It also means that the UAS must adhere to the designated airspace standards. Mr. Bruce Holmes, NASOPs Subcommittee member, questioned if the work in Unmanned Aircraft System Traffic Management (UTM)/UAS was adequate to fill the gap between UAS and urban mobility, considering the same

vehicle could fly anywhere from 30 up to 150 miles. He was concerned that Industry stakeholders believe the path to regulation could be more difficult moving forward. Mr. Prusak expressed reservations that when it came to UAS, the idea of airspace segregation was concerning especially since the demand will likely drive the UAS operational density to levels much higher than can be managed using manual Air Traffic Control (ATC) methods. Concluding the above discussion, Mr. Holmes stated that he was impressed with the dialogue between the FAA and the Industry concerning the UAS research plan as a good initial attempt in collaboration.

Presentation 1A01A Runway Incursion Reduction (RIRP) Update
Presenter *Ben Marple, Operations Research Analyst, FAA*

Summary:

Mr. Marple started the briefing by providing a breakdown of existing runway incursion technology investments that have the potential to cover approximately 50 major airports. The subcommittee questioned what Airport Surface Surveillance Concept (ASSC) was. Mr. Marple explained that it was a surveillance system very similar to Airport Surveillance Detection Equipment – Model X (ASDE-X). Mr. Marple provided an overview of the Small Airport Surveillance Sensor (SASS), which provides low-cost secondary surveillance for small airports. He explained SASS was a "proof-of-concept" research project to determine if candidate technology was feasible, with Technology Transfer to industry as the end result. Mr. Prusak inquired about the update rate to which Mr. Fee, Aviation Technical Systems Manager, FAA, responded that the update rate is less than one second.

Mr. Marple introduced the Surface Taxi Conformance Monitoring (STCM) initiative work, explaining that the STCM mission is to conduct research to determine if cockpit and/or tower-based taxi conformance monitoring systems can be developed to reduce Runway Incursions that result from taxi errors. Mr. Holmes questioned how this information can be used for pilot advisories, and what the best method was to leverage this information. Mr. Fee explained to the Subcommittee that this research is strictly 'proof-of-concept' work. Mr. Bertapelle, Full Committee member, questioned the magnitude of the benefits of STCM. Mr. Marple responded that the FAA is looking at performing a cost-benefit analysis for the project.

Presentation 1A11A Enterprise Concept Development
Presenter *Steve Bradford, Chief Scientist & Technical Advisor, FAA*

Summary:

Mr. Bradford briefed on the Enterprise Concept Development presentation. He focused on the benefits, research goals, past accomplishments, and future plans for this topic. He briefly introduced some of the enterprise research concepts such as Vertical Conformance Verifications (VCV), Notice to Airmen (NOTAM) Modernization, Space Vehicle Operations, and Class E Upper Airspace Management Concept Development.

Mr. Bradford explained the objective for VCV to leverage the use of automation, to explore how the availability of vertical rate information will improve controllers' ability to monitor aircraft conformance, increase efficiency and capacity in transition airspace. Mr. Bertapelle questioned the FAA's exploration of VCV activities, to which Mr. Bradford pointed that the FAA was currently performing research on VCV, explaining that it was a

near-term concept. He then stated that if VCV research activities of FY19 and FY20 remain on-track, then no follow-on work was needed for FY21.

Mr. Bradford then described NOTAM modernization, explaining that its objective was to provide timely flight critical information that was more current than other regularly scheduled publications. He then mentioned that the FAA would like to upgrade the NOTAM system by digitizing NOTAMS. Mr. Holmes asked if the FAA will deliver a graphical object or just the technology, to which Mr. Bradford responded that only the technology will be delivered, not a physical object.

Mr. Zellweger, Consultant/retired FAA inquired if there is a collaboration between the FAA and NASA regarding the FY21 emerging focal area research. Mr. Bradford explained that the FAA writes the concepts with NASA, then the FAA checks the requirements against the NextGen Segment Implementation Plan (NSIP).

Presentation 1A09D NextGen – New Air Traffic Management Requirements
Presenter *Arthur Orton, General Engineer, FAA*

Summary:

Mr. Orton briefed the Subcommittee on the New Air Traffic Management (ATM) Requirements program. His presentation explained that the program was needed to identify new opportunities to improve the efficiency and effectiveness of air traffic operations. The New ATM Research activities include the research and development of procedures, tools, and systems in support of operational improvements. These activities support the NextGen goal of expanding capacity and improving the strategic management of operations in the NAS. Mr. Orton identified that FY19 budget will be $7.5M, reduced by $1.5M from the FY18 budget of $9M.

Mr. Zellweger questioned the ownership of the Cloud Architecture, and how broad the scope of its applications will be. Mr. Orton replied that the New ATM program is conducting analyses that will enable the FAA to evaluate cyber-security measures and how they fit together. He further explained that the scope of applications was being discussed within the FAA.

Mr. Prusak inquired that during the Spring 2018 NAS Ops REDAC meeting the Subcommittee asked for a more specific financial breakdown of each activity, including costs. Mr. Orton explained that the New ATM programs follows the FAA's budget formulation process.

Presentation 1A01C Operations Concept Validation & Infrastructure (ATDP)
Presenter *Maureen Keegan, Program Manager, FAA*

Summary:

Ms. Keegan began the briefing with an overview of Advanced Technology Development and Prototyping (ATDP) for the Operations Concept Validation and Infrastructure program. ATDP investigates specific concept elements and drives operational and technical requirements and implications for human factors, training, and procedures. She explained that the Concept, Validation and Requirements (CVR) Operating Model is a 12-step process used for defining and validation of operational needs within the NAS. Ms. Keegan stated that typically the activities start at operational needs but can

also start much later in the process. Recommendations from external stakeholder sources are collected and reviewed, and a decision is then made.

Ms. Keegan introduced the Time-Based Flow Management (TBFM) – Traffic Flow Management System (TFMS) integration analysis and stated that the FAA has more work to do developing this concept. TBFM -TFMS integration identifies capabilities and/or data exchange between the two systems to optimize integrated strategic tactical flow management initiatives. The FAA conducts analysis to determine the most effective tools, in collaboration with NASA, to identify future investments and examining the implications of implementing the TBFM-TFMS concept work. Mr. Bertapelle questioned if the work in Charlotte, North Carolina, is an example of the tools being used. Ms. Keegan confirmed and explained that part of the initial TBO plan was making sure the tools are functioning correctly. Ms. Keegan also mentioned that there will be a field trial in Philadelphia, PA, and that MITRE was working to identify gaps and focus on process improvement.

Mr. Weber, Subcommittee member, inquired if research was underway to resolve problems with the use of big data and automation, to which Ms. Keegan replied that at the time it was not; however, she thought there was an opportunity to explore that concept in the future.

Presentation Deep Dive – Remote Tower Services (RTS)
Presenter *Andras Kovacs, Supervisory Ops Research Analyst, FAA*

Summary:

Mr. Kovacs began the briefing by giving an overview of the Remote Tower Project. He discussed how airports in Leesburg, Virginia, and Fort Collins, Colorado, were the initial sites where the project was initiated. The goal for the Remote Tower Services effort was to identify minimum standards that were needed to make remote towers a viable option. He stated that there were many airports around the United States that have aging towers. More specifically, 75 out of 148 Sponsor-owned FAA Contract Towers were over 40 years old. Going forward, the FAA wants to enable remote tower technology as a potential option to replace some of these aging Sponsor-owned FAA Contract Towers. Mr. Holmes inquired about the specific standards for the remote towers, to which Mr. Kovacs stated that remote towers would need to follow standards established by the FAA via Advisory Circulars (ACs). Mr. Holmes wanted to know when Automatic Dependent Surveillance Broadcast (ADSB) rolls out fully, if it will reshape any of the Remote Tower Service (RTS) framework. Mr. Kovacs responded that remote tower technology should generally be agnostic to the surveillance source, and able to ingest and display ADSB data, where applicable. Subcommittee member Mr. Jim Kuchar asked if there would be a new airspace category for the use of remote towers. Mr. Kovacs communicated that the FAA preferred to avoid adding additional airspace category, unless deemed necessary. This was due to push-back from the pilot community who believe that introducing new airspace categories would create too many airspace categories for the pilots, resulting in potential confusion, and significant re-training required. Mr. Weber questioned if there was any interest in expanding remote towers to FAA-owned towers, to which Mr. Kovacs answered that there isn't, at the moment. Adding to this topic, the Subcommittee Chairperson, Mr. Prusak expressed that, in his opinion, the barriers with remote towers are more people-based, and if whether the ATC community trusts machines vs. people performing the work.

Presentation A11.k Aviation Weather Research Program (AWRP)
Presenter *Randy Bass, Supervisory Physical Scientist, FAA*

Summary:

Mr. Randy Bass began his presentation defining the benefits of the Weather Program for the FAA, and the factors determining its success. He then outlined the Weather Program's accomplishments, in FY18 specifically with activities such as Convective Weather, Turbulence, Ceiling and Visibility (C&V), In-Flight Icing, Advanced Weather Radar Techniques (AWRT), Modeling Development and Enhancement (MDE), Quality Assessment (QA), Aviation Weather Demonstration and Evaluation (AWDE) Services, Terminal Aviation Icing Weather Information for NextGen (TAWIN) and High Ice Water Content (HIWC). Mr. Bass highlighted the expected and planned research activities anticipated in FY19 and FY20 such as AWDE, UAS Weather (Wx), Turbulence, C&V, etc. Next, he emphasized the emerging FY21 focal areas topics using quad charts for each topics' research requirements, outputs/outcomes, FY21 Planned Research and out-year funding requirements. Mr. Prusak praised the FY18 accomplishments, and then inquired about the next plan for these research activities. Mr. Bass responded that some of the research was ad-hoc every year while other tools become a part of the NextGen Weather Processor (NWP) into various work packages. Over the last year, the AWRP has been working with Program Management Offices (AJM-3) to roll out the all FAA weather requirements into operation.

Mr. Bass revealed that the Policy and Requirements Branch in Aviation Weather Division (AWD) is the clearinghouse for all FAA weather requirements. They take aviation weather needs and requests from the field (FAA, airlines, organizations, etc.), validate those requests as formal requirements, and then work with National Weather Service to determine if capabilities already exist to meet the request (government or industry capabilities), and if not, they conduct gap analyses to see if research is needed. If research is required, the information is sent to the Weather Program, and the FAA prioritizes it, develops a research plan, and conducts the research. If/when the research is complete, and the solution needs are met, the Policy and Requirements Branch works the transition phase with appropriate entities within the agency (FAA Program Management Organization (PMO), National Weather Service (NWS), etc.).

Mr. Bass offered the Subcommittee a detailed deep dive presentation on the Aviation Weather Division's new requirements and validation process for the FY19 Spring REDAC Meeting, and the benefits from the above process. The Subcommittee members were pleased and expressed enthusiasm for this briefing.

Presentation A12.c NextGen – Weather Technology in the Cockpit (WTIC)
Presenter *Gary Pokodner, General Engineer, FAA*

Summary:

Mr. Pokodner began the briefing by identifying the purpose of the WTIC program, which is to identify casual factors in weather-related General

Aviation safety risks and hazards. He then discussed the out-year budget by going over the funding profile of the WTIC program. He explained that the funding level was expected to decrease in FY19 to $1.027M, and further down to $0.939M in FY20. Mr. Pokodner stated that due to the expected low budget, there will not be many new research activities. The FAA will prioritize research activities and align them with agency goals and initiatives. Mr. Pokodner explained that the WTIC program will have a reduced ability for outreach and transition of research and delay the start of new projects to resolve gaps not yet addressed. The Subcommittee asked if WTIC will suffer under the FY19 budget. Mr. Pokodner explained that the reduced FY19 budget will present unique funding challenges; however, the program will adjust and direct attention to completing ongoing projects that can be worked in smaller phases. When asked if the WTIC program extended to the UAS weather program, Mr. Pokodner said that it was not for now, but that he was interested in discussing it. The Subcommittee members expressed appreciation of the WTIC briefing and emphasized the importance of the program as it transitions into commercial applications.

Presentation A11.n – Commercial Space Transportation (CST)
Presenter *Paul Wilde, Supervisory Aerospace Engineer and Ken Davidian, Aerospace Engineer, FAA*

Summary:

Mr. Davidian began the briefing by providing an overview of the Office of Commercial Space Transportation (AST) portfolio structure and mission. AST's mission is to ensure the protection of the public, property, national security, and foreign policy interests of the United States during commercial launch and reentry, and to encourage, facilitate, and promote United States commercial space transportation.

Mr. Prusak questioned whether Time Based Operations (TBO) was a forgone conclusion, and how the FAA will track space vehicles without using TBO. Mr. Wilde stated that the FAA gets the telemetry information from the provider; and in terms of controlling, the focus was not on tracking where the vehicle went, but where all the debris fell if it broke apart. Mr. Prusak then asked if a block of airspace was used every hour, how it worked in terms of not segregating airspace, and how did it tie in to the NAS Operations. Mr. Wilde stressed that shared communications about when the rocket was ready to launch was vital.

Mr. Zellweger inquired if the FAA had performed an industry scan to identify when continuous launches would be feasible. In his response, Mr. Wilde explained that this technology was not imminent, and it was their department's belief that it will not occur in the next 1-2-year timeframe either. Mr. Prusak asked if the four pillars of research (Aerospace Access & Operations, Aerospace Vehicles, Human Ops & Spaceflight, and Industry Innovation) were equal, or if one was more important. Mr. Wilde explained that research areas, one and two (Aerospace Access & Operations, Aerospace vehicles), were the main research focus areas. Those pillars account for the majority of the funding and work.

Mr. Wilde and Mr. Davidson informed the REDAC that their MITRE staff would be available on Day 2 of the NAS Ops meeting to provide additional information on AST.

Presentation Findings and Recommendations (F&R) Discussion
Presenter *Subcommittee*

Discussion – The Subcommittee Chairperson, Mr. Prusak, summarized a few of the action items and possible F&Rs that were captured during Day 1 of the NASOPS REDAC meeting, such as a potential F&R for a TBO briefing, a deep dive from Randy Bass, a briefing on COE, etc. The Subcommittee confirmed that they will be providing the FAA with a list of action items and F&Rs for this REDAC meeting in the next 2-3 weeks.

Day 2 – September 6th, 2018 (Veracity)

Presentation Review Findings and Recommendations/New Actions
Presenter *Subcommittee*

Discussion – The Subcommittee Chairperson, Mr. Prusak, decided that the NASOPS REDAC will postpone the Subcommittee discussion to the end of Day 2 of the NASOPS REDAC Meeting, and would like to hear from MITRE for additional information on Commercial Space Transportation activities.

Presentation MITRE – Additional Information Brief for CST
Presenter Dean Fulmer

Summary: This briefing was provided to the Subcommittee members on the request of Mr. Paul Wilde as a supplementary briefing to answer any additional questions on Commercial Space Transportation. The briefing was published as a white paper titled as Preliminary Exploration of Using Traffic Management Initiatives to Efficiently Manage Aircraft Impacted by Launch/Reentry Operations. Mr. Fulmer explained to the Subcommittee members that this white paper publication was a collaboration between MITRE, the Office of Commercial Space Transportation (AST), Air Traffic Operations (ATO) system operations, and Time-Based Flow Management (TBFM) program.

The Traffic Management Initiatives (TMI) assessed the following programs: Airspace Flow Program (AFP), Collaborative Trajectory Options Program (CTOP), Metering (Time-Based Flow Management) and Airborne Reroutes (ABRR) to identify how existing TMIs could potentially be used to efficiently separate aircraft from Launch and Reentry operations. The researchers first reviewed the current procedures, then the time cleared versus actual hazardous areas. Mr. Fulmer stated that the expected benefits from this application would potentially reduce delays and reroutes. The presenter further acknowledged research challenges and recommendations to resolve those in the next steps by establishing partnerships and conducting experiments.

Presentation 1A07A0 Enterprise Human Factors (HF)
Presenter *Bill Kaliardos, Scientific and Technical Advisor, FAA*

Summary: Per the briefing, the Enterprise Human Factors Development program provided integrated guidance on human performance considerations to concept development, validation and implementation teams. The plan was to give the program a higher-level approach in the hopes of getting more programs to leverage HF recommendations. Mr. Kaliardos elaborated through his presentation that there was also a later plan to integrate HF into Time Based Operations (TBO). The Subcommittee initiated a discussion if the Performance Based Navigation (PBN) procedures were being utilized at all airports. Mr. Bertapelle rhetorically asked why the industry invested into PBN research, design, equipage, and implementation, and was not being used. In his opinion, HF needed to be incorporated into PBN at an initial phase. The Subcommittee members questioned if a cultural shift or technology overload was the reason for PBN's lack of success. They collectively agreed that the Industry should start investing in HF as well. Mr. Prusak and Mr. Kuchar, Subcommittee member, expressed a concern with the lack of specificity in the HF research. They acknowledged that just signing off on the acquisition of new capabilities was insufficient and agreed that there should be a better accountability on how programs track the use of HF research, and that more follow up was essential, especially post implementation.

Presentation A11.i – Air Traffic Control/Technical Operations Human Factors
Presenter *Dan Herschler, Scientific and Technical Advisor for HF, FAA*

Summary: Mr. Herschler began his briefing by outlining the benefits of the ATC/Tech Ops Human Factors division to the FAA, and what determined the program's success. He reported that out of the total Research and Development (R&D) budget of $74M proposed by the administration, Human Factors Tech Ops would be receiving $143,000 for the contracts. He further informed the Subcommittee members on the FY18 accomplishments, anticipated research in FY19 and FY20, as well as the emerging focal areas for FY21. Mr. Kuchar expressed concern that studies identifying and mitigating automation effects on controller performance suggested there was a problem with automation and perhaps the focus should be elsewhere in the research.

Presentation A12.a Wake Turbulence / 1A05C Wake Re-Categorization
Presenter *Paul Strande, Program Manager, Jeff Tittsworth, General Engineer, and Jillian Cheng, General Engineer, FAA*

Summary: The Wake R, E&D and Recategorization, and the Wake Turbulence programs were briefed by the Wake technical lead Ms. Jillian Cheng and Mr. Tittsworth. Ms. Cheng reported that the Wake R&D and RECAT projects support the NextGen objective to accommodate increased demand during peak periods. These programs mature wake mitigation operational concepts to the point they can be directly implemented by FAA orders. She further elaborated on the anticipated planned research activities and products in FY20/21 for both Wake Turbulence and Wake Re-Categorization. To Mr. Holmes' question where the standards for in-flight observed weather will be published, Ms. Cheng responded that they were looking at using real time wind information. The standards will be sent via ADS-B, and a white paper will be

coming out. Radio Technical Commission for Aeronautics (RTCA) DO-260 revisions were underway and it was scheduled for approval March 2020. She further stated that Mr. Johnson, the Wake Chief Scientific and Technical Advisor (CSTA) will be their focal point and then offered to request information if needed.

Presentation 5G Capabilities & other emerging communication technologies in the NAS
Presenter *Dr. Gerard Hayes*

Summary: Dr. Hayes, from the Wireless Research Center of North Carolina in conjunction with the Smart Sky Networks, briefed the subcommittee regarding the upcoming 5G opportunities in aviation. He began his presentation by addressing the aviation communication challenges by highlighting how networks communicate and react in a smart and coordinated way with each other. Mr. Hayes then outlined the connectivity for aviation innovation for vehicle and airspace management. He further emphasized the aspects of 5G that creates a unified communication architecture from small sensors to high throughput data devices, and how the aviation industry can utilize the different aspects of 5G within the various ecosystems. He further listed the affordable deployment options, the diverse services, the opportunities, and his next steps to include 5G networks within the FAA. Subcommittee member, Joe Bertapelle, inquired if any equipment would be removed with the inclusion of this technology, to which the speaker responded that most likely this technology will eliminate some redundant radios. Mr. Holmes expressed interest in inviting Dr. Hayes to brief the FAA on how to best utilize 5G capabilities in aviation.

Presentation Runway Friction Research
Presenter *Paul Geisman, Aerospace Engineer/Flight Performance, FAA*

Summary: Mr. Geisman began his presentation informing the NASOPS Subcommittee members that he had presented his briefing earlier to the Airports Subcommittee as well. The FAA technical working group was tasked with assessing the results of ongoing and completed FAA research on Aircraft Braking Friction and make recommendations regarding the direction of future efforts. The participants of the working group included representatives from the FAA, academia, aircraft/braking system manufacturers, and others developing the runway braking friction technologies. The product was a white paper produced by the technical working group, forwarded to the REDAC subcommittee members. Mr. Geisman briefed the Friction Research participants on the background, gap analysis, friction research recommendations, and future aviation considerations.

Presentation Future Issues and Opportunities Reassessment
Presenter *Leo Prusak*

Discussion – The Subcommittee Chairperson, Mr. Leo Prusak, and member, Mr. Bruce Holmes, along with other Subcommittee members identified and

examined a few areas for future topics and opportunities to recommend. Mr. Holmes thought it would be very beneficial to have a deep dive by the IBM Watson Chief Technical Officer (CTO) to discuss the use of 5G capabilities and the use of big data in the NAS. Subcommittee members also suggested getting a briefing from MITRE on 5G capabilities, Big Data and the use of Speech Recognition/ Artificial Intelligence (AI). Mr. Prusak assigned Mr. Weber, Ms. Steltzer, and Mr. Kuchar to come with a plan or a recommendation regarding Big Data.

Presentation Subcommittee Discussion Recap & Closing
Presenter *Leo Prusak*

Discussion – Mr. Prusak concluded the meeting by summarizing the actions for the Subcommittee members for writing the findings and recommendations (F&Rs) on the briefing topics discussed earlier, such as Shelley Yak's request from the Subcommittee members to provide feedback on the R&D Landscapes, possible F&Rs on the HF Research, etc. Mr. Prusak informed the members that he would be reaching out to the FAA with action items and recommendations prior to the full REDAC, which will be held in October 2018.

CLOSED ACTION ITEMS

August 2015 NAS Ops Meeting

Action	Assigned	Status
Inspect the FAA process to move weather concepts from requirements to implementation. Determine if the required elements are in place and if there are disconnects. Consider logistic and level of participation of members on the Requirements Management Board. Provide recommendations to the subcommittee	M. Weber J. Kuchar	Closed 3/27/18

August 2016 NAS Ops Meeting

Action	Assigned	Status
Provide the subcommittee a copy of the UAS research plan (when available)	Ann Cihon	Closed 4/11/18

March 2017 NAS Ops Meeting

Action	Assigned	Status
1a. UAS in the NAS & UTM/DAC interaction with RTTs (S. Bradford/J.Cavolowsky)	S. Bradford	Closed 3/27/18
1b. Pathfinder Program Updates/Organizational Mapping (S. Bradford)	S. Bradford	Closed 3/27/18
2. Set up a telecom to brief SMDP results to subcommittee	M. Molz	Closed

September 2017 NAS Ops Meeting

Action	Assigned	Status
1. RIRP will provide a briefing to the subcommittee on: • Detailed risk reduction analysis work • A determination of which technology investments could meet the operational need	Ben Marple/James Fee	Closed 3/28/18
2. Commercial Space Integration will provide a concept of operations briefing highlighting the following: • Budget allocations • Detail funding that exists to conduct research to support the predicted space launches without significant impact to the NAS	Paul Wilde	Closed 3/28/18
3. New ATM Requirements will provide detailed briefing on the following, at the Spring REDAC • Budget Allocation • A description of how each New ATM Requirements activity is quantified	Francisco Bermudez	Closed 3/28/18

• Information on how activities related to data comm and NAS Systems in a cloud environment are coordinated • Detail on the vision for future NAS information systems		
4. Operations Concept Development & Infrastructure (ATDP) will the provide details to the subcommittee on Operational Concept work • Provide additional detail on next Operations Concept Development • Review the scope of Operational Concept research • Overview of the processes that has been defined to structure and align concept definition and validation • Description of how existing NextGen processes are being used to inform research	Maureen Keegan	Closed 3/28/18

March 2018 NAS Ops Meeting

Action	Assigned	Status
New ATM Requirements • The subcommittee asks that, at future meetings, the funding amount that has been allocated to each subtask is also provided along with the subtask descriptions. • The subcommittee requests additional information on how the 1A09D portfolio will support potential ATM changes driven by these disruptive concepts and technologies.	Arthur Orton	Closed 9/5/18
Pathfinder • The Subcommittee requests this project to include budget, progress, plans, and implications to the broader needs of UAS in the NAS, UTM, and such emerging developments as Urban Air Mobility and related airspace management needs.	Steve Bradford	Closed 9/5/18
Remote Tower Project • The Subcommittee requests this project to include budget, progress, plans, and the implications of advancements such as space-based ADS-B.	Andras Kovacs	Closed 9/5/18
ATDP - Operations Concept Development and Infrastructure • The subcommittee requests that these briefings detail how research in these three areas is mitigating risk associated with the operational integration of these concepts. • The subcommittee also requests information about how funding within the budget line is divided between the three identified focus areas.	Maureen Keegan	Closed 9/5/18

Open Action Items

September 2018 NAS Ops Meeting

Action	Assigned	Status
Cybersecurity The Subcommittee requests this project to include budget, progress, plans, and summary of the public-private partnering aspect of the project.	Isadore B.	Open
Future Issues and Opportunities Reassessment The subcommittee suggested to do a deep dive by the IBM Watson CTO to discuss the use of 5G capabilities and the use of big data in the NAS. Also, a request to get a deep dive briefing from MITRE on 5G capabilities, Big Data and the use of Speech Recognition/ Artificial Intelligence (AI).	Bruce Holmes/Emily Stelzer	Open
Aviation Weather Research Program AWRP program offered the subcommittee a deep dive presentation on the Aviation Weather Division's new requirement and validation process.	Randy Bass	Open
Setting the Strategic Landscape Ms. Shelly Yak requested the NAS OPS subcommittee to provided feedback on the strategic landscapes and identify industry research investments prior to the Spring 2019 REDAC meeting.	Leo Prusak	Open

ATTENDEES

Subcommittee Members in Attendance:

Leo Prusak (Chairperson)
Francisco Bermudez (DFO)
Bruce Holmes
Mark Weber
Andres Zellweger
Jim Kuchar
Emily Stelzer

Others in Attendance:

Shelley Yak
Maureen Molz
Chinita Roundtree-Coleman
Mike Gallivan
Frank Wondolowski
Steve Bradford
Dan Herschler
Gary Pokodner
Arthur Orton
Todd Lewis
Sadaf Alam
Brian Powers
Randy Bass
Paul Wilde

AGENDA

Wednesday, September 5th

Location: 955 L'Enfant Plaza SW #700, Washington, DC 20024

Time	Topic	Presenter(s)
0800-0815	Welcome/Overview	Leo Prusak Francisco Bermudez
0815-0845	Review of REDAC Recommendations, Responses and Open Actions	Leo Prusak
0845-0915	Budget Briefing	Mike Gallivan
0915-0945	Setting the Strategic Research Landscape	Shelley Yak
0945-1015	UAS Research Plan – NAS Ops Review Discussion	Subcommittee
1015-1030	Break	
1030-1100	1A01A Runway Incursion Reduction (RIRP) Update Progress of RIRP benefits analysis	Ben Marple
1100-1130	1A11A Enterprise Concept Development	Steve Bradford
1130-1200	1A09D NextGen – New Air Traffic Management Requirements	Arthur Orton
1200-1300	Lunch	
1300-1330	1A01C Operations Concept Validation & Infrastructure (ATDP)	Maureen Keegan
1330-1400	Deep Dive – Remote Tower Project	Andras Kovacs
1400-1430	A11.K Weather Program	Randy Bass
1430-1500	A12.c NextGen – Weather Technology in the Cockpit (WITC)	Gary Pokodner
1500-1515	Break	
1515-1545	A11.N Commercial Space Transportation (CST)	Paul Wilde
1545-1645	F&R Discussion	Subcommittee
1715	Dinner – location TBD	

Thursday, September 6th

Location: 955 L'Enfant Plaza SW #700, Washington, DC 20024

Time	Topic	Presenter(s)
0800-0830	Review Findings and Recommendations	Leo Prusak
0830-0930	1A07A0 Enterprise Human Factors	Bill Kaliardos
0930-1000	A11.i Air Traffic Control/Technical Operations Human Factors	Dan Herschler
1000-1015	Break	
1015-1030	A12.a Wake Turbulence	Paul Strande
1030-1100	1A05C Wake Turbulence Re-Categorization	Paul Strande
1100-1200	Future involvement of 5G capabilities and other emerging communications technologies in the NAS	Dr. Gerard Hayes
1200-1300	Lunch	
1300-1400	Runway Friction Research	Paul Geisman
1400-1500	Future Issues and Opportunities Reassessment	Leo Prusak
1500-1515	Break	
1515-1600	F&R Discussion	Subcommittee
1600-1645	Recap & Closing	Leo Prusak