



**FAA**

Report AV2022027  
April 27, 2022

---

## FAA Made Progress Through Its UAS Integration Pilot Program, but FAA and Industry Challenges Remain To Achieve Full UAS Integration



## FAA Made Progress Through Its UAS Integration Pilot Program, but FAA and Industry Challenges Remain To Achieve Full UAS Integration

---

*Requested by the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation*

Federal Aviation Administration | AV2022027 | April 27, 2022

---

### What We Looked At

Recognizing that Unmanned Aircraft System (UAS) is the fastest growing segment of the aviation industry and in response to a Presidential Memorandum, the Federal Aviation Administration (FAA) initiated the 3-year UAS Integration Pilot Program (IPP) in 2017. Through the IPP, FAA worked with selected State, local, and tribal governments, who partnered with private sector entities (e.g., UAS operators) to accelerate safe integration and help develop new rules to enable more complex UAS operations in the National Airspace System (NAS). After ending the IPP as planned in October 2020, FAA launched a follow-on program called BEYOND to address remaining UAS-related challenges, including operations beyond visual line of sight. Citing the importance of the IPP's efforts, the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation requested that we assess FAA's IPP, including next steps. Accordingly, our audit objectives were to assess (1) the results of FAA's IPP and (2) FAA's plans for using those results, including how the Agency will incorporate them into its new program BEYOND.

### What We Found

While FAA made progress advancing UAS operations through the IPP, results did not fully meet industry and participant expectations and integration challenges remain. Further, challenges with planning, data requirements, and the Agency's organization hindered the IPP's overall success. FAA also faced challenges balancing the need to ensure aviation safety with UAS innovation, especially given the complexity of proposed operations. In addition, issues coordinating across multiple FAA lines of business and Agency turnover contributed to participant frustration and program challenges. Finally, while FAA incorporated lessons learned and best practices into BEYOND, challenges that limited the IPP's success remain. As a result, it is uncertain when FAA and industry will be positioned to enable operations beyond visual line of sight that are economically viable throughout the NAS.

### Our Recommendations

We made six recommendations to improve FAA's use of UAS IPP results, including in its current program, BEYOND. FAA concurred with all six of our recommendations and provided appropriate actions and planned completion dates.

---

# Contents


Memorandum	1
Results in Brief	3
Background	4
While FAA’s IPP Advanced UAS Operations, Results Did Not Fully Meet Industry and Lead Participant Expectations, and Challenges Remain	7
FAA Incorporated Lessons Learned and Best Practices Into BEYOND but Has Not Resolved Challenges That Limited the IPP’s Success	19
Conclusion	24
Recommendations	25
Agency Comments and OIG Response	26
Actions Required	26
<b>Exhibit A.</b> Scope and Methodology	27
<b>Exhibit B.</b> Organizations Contacted	29
<b>Exhibit C.</b> List of Acronyms	31
<b>Exhibit D.</b> Major Contributors to This Report	32
<b>Appendix.</b> Agency Comments	33



## Memorandum

Date: April 27, 2022

Subject: ACTION: FAA Made Progress Through Its UAS Integration Pilot Program, but FAA and Industry Challenges Remain To Achieve Full UAS Integration | Report No. AV2022027

From: Nelda Z. Smith   
Acting Assistant Inspector General for Aviation Audits

To: Federal Aviation Administrator

---

The rapidly growing number of Unmanned Aircraft Systems (UAS) (commonly known as “drones”) in the National Airspace System (NAS) presents a substantial opportunity for economic and technological development. It also poses one of the most significant safety challenges that the Department of Transportation (DOT) and the Federal Aviation Administration (FAA) have faced in decades. Recent FAA forecasts indicate that the number of UAS in the United States is likely to exceed 2 million by 2022, and FAA has already processed more than 1 million UAS registrations for commercial operators and hobbyists since 2015.

Recognizing that UAS is the fastest growing segment of the aviation industry and in response to an October 2017 Presidential Memorandum, FAA initiated a 3-year UAS Integration Pilot Program (IPP) and worked with selected State, local, and tribal governments, who partnered with UAS operators, manufacturers, and other entities. The IPP’s objectives included accelerating the safe integration of UAS into the NAS and helping DOT and FAA develop new rules to enable more complex UAS operations. Participants tested and collected technical data and then reported to FAA on outcomes and challenges, such as package delivery and other UAS operations conducted beyond visual line of sight.

However, as the program deadline approached, congressional representatives expressed concerns with a lack of clarity regarding overall program results and next steps. FAA ended the IPP as planned in October 2020 and then launched a new program called BEYOND to address remaining UAS-related challenges, including flights beyond visual line of sight. Citing the importance of the IPP’s efforts, the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation requested that we assess FAA’s IPP. Specifically, they asked us to evaluate FAA’s processes to foster

communication and data exchanges with stakeholders; efforts to assess participants' risk mitigations; progress toward developing new rules, policies, and guidance; and next steps for a second phase, including goals and milestones. Accordingly, our audit objectives were to assess (1) the results of FAA's IPP and (2) FAA's plans for using those results, including how the Agency will incorporate them into its new program BEYOND.

We conducted this audit in accordance with generally accepted Government auditing standards. Exhibit A details our scope and methodology. Exhibit B lists the organizations we visited or contacted, and exhibit C lists the acronyms used in this report.

We appreciate the courtesies and cooperation of Department of Transportation representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-2140 or Robin Koch, Program Director, at (404) 562-3776.

cc: The Secretary  
DOT Audit Liaison, M-1  
FAA Audit Liaison, AAE-100

---

## Results in Brief

### **FAA made progress advancing UAS operations through the IPP, but results did not fully meet industry and participant expectations, and integration challenges remain.**

FAA's IPP helped the Agency advance complex UAS operations. For example, according to FAA data, participants conducted over 21,000 test and operational flights across the country, including package deliveries and infrastructure inspections. FAA also issued the first air carrier certificates enabling commercial deliveries to two UAS operators, both partners of IPP lead participants. However, the program did not fully meet industry or lead participant expectations. In particular, the IPP did not accomplish a key industry goal of enabling routine beyond visual line of sight operations, due in part to technological and regulatory challenges that FAA and industry are still working to resolve. Further, challenges with planning, data requirements, and the Agency's organization hindered the IPP's overall success. This is in part because FAA did not establish metrics or benchmarks by which to evaluate program success. For example, while FAA established three qualitative success areas to report IPP accomplishments, these areas were broad and did not contain specific or measurable goals for guiding and tracking progress. Further, FAA faced challenges balancing the need to ensure aviation safety with UAS innovation, especially given the complexity of proposed operations. For example, seven of nine lead participants identified FAA's reluctance to accept certain risk mitigations as a limiting factor in reaching their program goals. While Agency representatives acknowledged internal differences regarding allowable risk for UAS approvals, they also noted the lack of an existing regulatory framework, safety data, or mature technology as challenges in UAS integration. In addition, issues coordinating across multiple FAA lines of business and Agency turnover contributed to participant frustration and program challenges. As a result of these remaining challenges, especially regarding operations beyond visual line of sight, FAA initiated a 4-year follow-on program called BEYOND.

### **FAA incorporated lessons learned and best practices into BEYOND, but challenges that limited the IPP's success remain.**

FAA implemented changes to its follow-on program based on experience and feedback from participants. For example, the Agency included more details in the agreements with lead participants and streamlined the data reporting requirements. Additionally, FAA carried over two best practices from the IPP into BEYOND: dedicated Agency program managers for each lead participant, and structured community engagement efforts. However, FAA and industry have yet to resolve multiple challenges, and the effectiveness of the changes to BEYOND

may not be known until its completion in October 2024. For example, as of November 2021, only half of the lead participants had conducted operations under BEYOND, due to factors including COVID-19-related program delays; resource constraints; continued work finalizing concepts of operation; and the need for participants or partners to obtain air carrier certificates or other FAA approvals. Further, FAA has not yet finalized its BEYOND program plan or success metrics and has no target date for their completion. In addition, FAA still faces challenges balancing aviation safety with innovation, and participants continue to express concerns about the Agency's risk acceptance process. Finally, FAA has not yet addressed challenges of inconsistency across the various lines of business or program staff turnover. As a result, it remains uncertain when FAA and industry will be positioned to enable operations beyond visual line of sight that are economically viable throughout the NAS.

We made six recommendations to improve FAA's use of UAS IPP results, including in its current program, BEYOND.

---

## Background

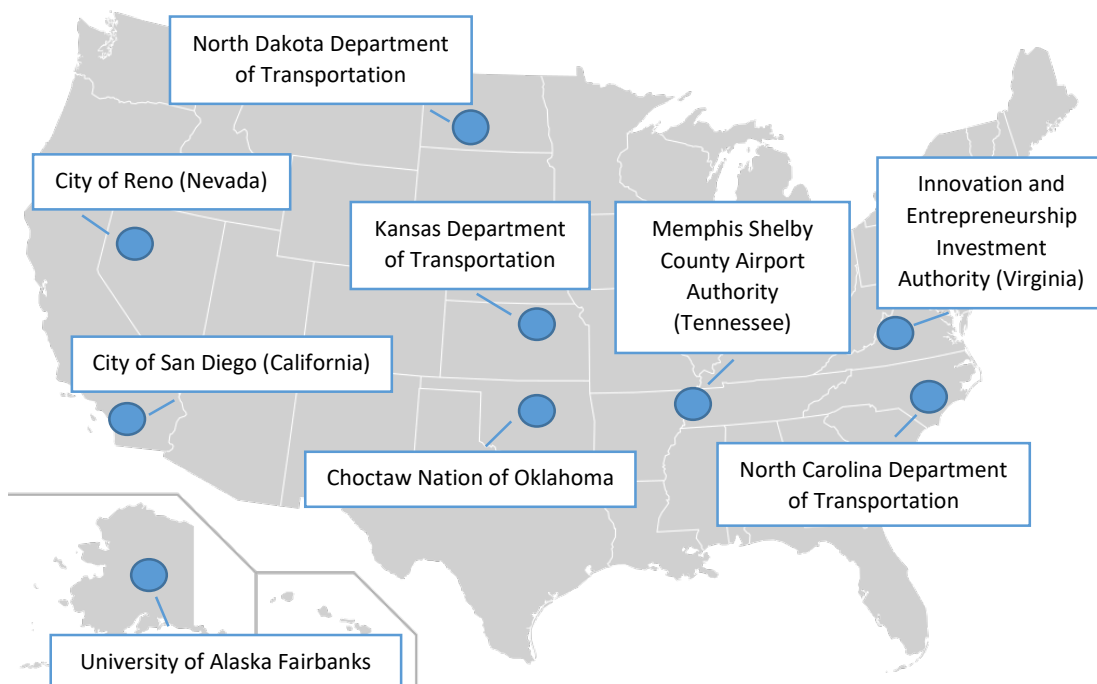
To enable more complex operations and advance UAS integration into the NAS, FAA established the IPP in response to the October 2017 Presidential Memorandum. In November 2017, FAA issued a Federal Register Notice<sup>1</sup> outlining the application process, selection criteria, and participant requirements. Over the next 5 months, FAA reviewed 149 applications submitted by State, local, and tribal entities from across the United States, looking for diversity in multiple aspects of the proposals such as testing a variety of use cases in a diverse set of environments. On May 9, 2018, the Secretary of Transportation announced the selected participants, which are located throughout the United States (see figure 1).<sup>2</sup>

---

<sup>1</sup> FAA, *Unmanned Aircraft Systems Integration Pilot Program—Announcement of Establishment of Program and Request for Applications*, 82 FR 51903 (2017).

<sup>2</sup> A 10th lead participant, Lee County Mosquito Control District in Florida, initially participated in the IPP but then formally ended its involvement in February 2019 due to resource constraints.

Figure 1. IPP Lead Participants



Source: OIG analysis of FAA information

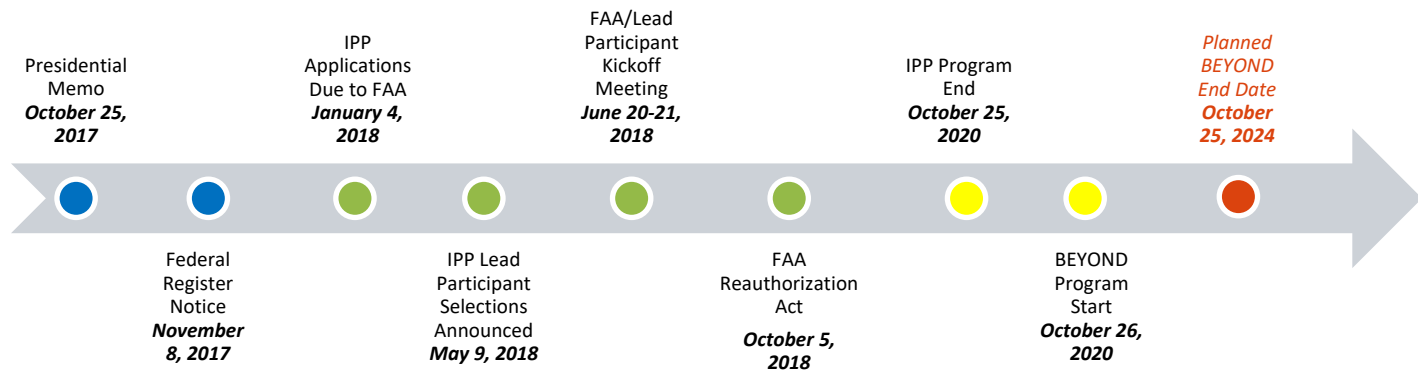
Subsequent to the memorandum, the FAA Reauthorization Act of 2018<sup>3</sup> codified the IPP's objectives. Upon the program's conclusion in October 2020, eight lead participants<sup>4</sup> continued into FAA's follow-on program BEYOND. The program is scheduled to end in October 2024, a date decided internally according to FAA's best estimate of sufficient program duration (see figure 2 for key dates).

<sup>3</sup> Pub. L. 115-254, § 351 (October 5, 2018), codified at 49 U.S. Code (U.S.C.) § 44802 note.

<sup>4</sup> The City of San Diego is not one of the BEYOND lead participants due in part to resource constraints.



Figure 2. IPP and BEYOND Key Dates



Source: OIG analysis of FAA data

Prior to the IPP, FAA had already begun issuing regulations for small UAS operations. In June 2016, FAA published a rule<sup>5</sup> permitting small UAS to fly commercially in certain airspace<sup>6</sup> with a number of restrictions. However, the rule also allows commercial UAS operators to apply for a waiver to deviate from several provisions if the Agency finds the proposed operation can be performed safely. Certain waiver applications—such as those for UAS operations conducted beyond visual line of sight—require more complicated, intensive analysis of the applicant’s safety case. These regulations and waiver requirements applied to operations conducted as part of the IPP, as well as to UAS operators and flights occurring outside of the program (see table 1).

<sup>5</sup> Operation and Certification of Small Unmanned Aircraft Systems, 81 FR 42064 (June 2016) (creating 14 CFR Part 107).

<sup>6</sup> UAS operations are allowed in airspace where FAA air traffic control services are not provided (Class G). Operation in all other “controlled” airspace classes requires authorization from the Agency’s Air Traffic Organization (Class B, C, D, and E).

Table 1. Small UAS Rule Provisions Subject to Waiver During the IPP\*

Operations From a Moving Vehicle (§ 107.25)	Daylight Operation (§ 107.29)
Visual Line of Sight (§ 107.31)	Visual Observer (§ 107.33)
Operations of Multiple Small UAS (§ 107.35)	Yielding Right of Way (§ 107.37a)
Operations Over People (§ 107.39)	Operations in Certain Airspace (§ 107.41)
Maximum Ground Speed (§ 107.51a)	Maximum Altitude (§ 107.51b)
Minimum Flight Visibility (§ 107.51c)	Cloud Minimum (§ 107.51d)

*\*As of April 2021, FAA’s operations over people final rule<sup>7</sup> no longer requires a waiver for routine operations of small unmanned aircraft over people, over moving vehicles, or at night under certain conditions.*

Source: OIG analysis of 14 CFR §107.205, List of regulations subject to waiver during the IPP’s timeframe of October 2017-October 2020

Our prior work<sup>8</sup> found that FAA faced challenges in its waiver review and approval process, including difficulties obtaining sufficient information, managing the volume of requests, and communicating with applicants. Based on our recommendations, FAA took steps to improve its guidance and processes, such as implementing standardized response templates when requesting more information from applicants and providing clarification to UAS operators on certain operational provisions.

## While FAA’s IPP Advanced UAS Operations, Results Did Not Fully Meet Industry and Lead Participant Expectations, and Challenges Remain

FAA’s IPP accomplished test and operational flights that helped the Agency take steps to advance UAS operations. However, the program overall did not fully meet industry or lead participant’s expectations, and FAA and industry are still working to resolve remaining technological and regulatory challenges. Further, challenges with planning, data requirements, and the Agency’s organization hindered the overall success of the IPP, including advancement of more complex UAS operations, such as routine beyond visual line of sight operations.

<sup>7</sup> Operation of Small Unmanned Aircraft Systems Over People, 86 FR 4314 (Jan. 15, 2021); see also Operation of Small Unmanned Aircraft Systems Over People; Delay; Withdrawal; Correction, 86 FR 13630 (March 10, 2021), which corrected the final rule and delayed the effective date from March 16, 2021 to April 21, 2021.

<sup>8</sup> *Opportunities Exist for FAA To Strengthen Its Review and Oversight Process for Unmanned Aircraft System Waivers* (OIG Report No. AV2019005), November 7, 2018. OIG reports are available on our website at <http://www.oig.dot.gov/>.

---

## FAA's IPP Made Progress Advancing UAS in the NAS, but Technical and Regulatory Issues Remain

FAA made progress in three main areas: (1) test and operational flights, (2) guidance, and (3) certifications.

- **Test and Operational Flights.** According to FAA data, lead participants and their industry partners conducted more than 21,000 test and operational flights across the United States. Participants engaged in activities such as infrastructure inspection, package delivery, and agricultural monitoring. While the COVID-19 pandemic caused program delays, some lead participants and partners were able to shift and conduct pandemic-related operations. For example, North Carolina DOT and several partners delivered food and medical supplies to private homes, and transported medical items between health care facilities. Examples of IPP operations are shown in figure 3.

---

Figure 3. IPP Operations



Source: OIG analysis of FAA information

Between July 2018 and October 2020, FAA approved each participant to conduct different types of operations, including operations conducted under 87 different regulatory waivers, such as flights over people. While operations occurred at all lead participant sites, the number of flights, hours flown, or waivers obtained varied significantly. For example, three of nine lead participants completed 90 percent of the flights. According to FAA, participant success varied due to a number of different factors, including: partners and resources; operational complexity; design and technological maturity; and safety mitigation strategies and capabilities.

- **Guidance.** According to FAA, the flight data collected throughout the program and experience gained throughout the review and approval process helped inform guidance including a new certification compliance method based on the durability and reliability of the unmanned aircraft.<sup>9</sup> FAA also credits the IPP with informing a new policy related to assessing the safety of proposed UAS operations.<sup>10</sup> This new guidance supplements an existing risk management policy, establishes a process for Agency representatives to review UAS operations requests, and defines FAA's roles and responsibilities in assessing and evaluating risks and proposed mitigations.
- **Certifications.** FAA issued the first air carrier certificates<sup>11</sup> to two industry partners of lead participants by the program's end.<sup>12</sup> This certification enabled the operators to engage in package delivery for compensation under FAA regulations,<sup>13</sup> also a first for UAS. Another operator we interviewed started the application process during the IPP and is working with FAA to earn their air carrier certification as part of BEYOND. FAA granted the first two air carrier certificates using special authority granted in the 2018 Reauthorization Act<sup>14</sup> that permits waiver of the type certification<sup>15</sup> requirement for aircraft on a case-by-case basis.

In addition, a key intent of the program as noted in the Presidential Memorandum was to provide a collaborative mechanism between the Agency and stakeholders on UAS operations. In this regard, both FAA and most IPP lead

---

<sup>9</sup> Currently, the source of this method of compliance is an issue paper prepared as part of an unmanned aircraft certification project and has not yet been incorporated into FAA guidance.

<sup>10</sup> FAA Order 8040.6, *Unmanned Aircraft Systems Safety Risk Management Policy* (October 4, 2019).

<sup>11</sup> In order to be considered air carriers, these operators received FAA certification under 14 CFR Parts 119 and 135.

<sup>12</sup> One of these two industry partners began the certification process prior to the start of the IPP.

<sup>13</sup> 14 CFR § 135.87, *Carriage of Cargo*.

<sup>14</sup> Pub. L. 115-254, § 347(b)(2); 49 U.S.C. § 44807(b)(2), Special Authority for Certain Unmanned Aircraft Systems (permitting the Secretary to determine, in part, whether a certificate issued under 49 U.S.C. § 44704 is necessary). This provision expires in September 2023, but approvals already granted under this provision will remain in effect.

<sup>15</sup> A type certificate is an approval document issued by FAA under 49 U.S.C. § 44704 that states a specific aircraft model is compliant with airworthiness regulations.

participants concluded the program was successful. For example, eight of the nine lead participants identified the increased access to FAA, enabled by the IPP, as a significant benefit to their program.

However, while the IPP provided opportunities and enabled progress for the Agency and participants, outcomes did not fully meet industry or lead participant expectations. In particular, the IPP did not accomplish a key industry goal of enabling routine beyond visual line of sight operations. FAA and industry have identified enabling these operations as one of the most important regulatory and technological hurdles to overcome on the pathway toward full UAS integration.<sup>16</sup> Although some participants were able to perform such operations, they contained restrictions, such as use of visual observers or a limited flight area. According to FAA, these restrictions were to ensure safety as the concepts were being tested.

Other challenges lead participants cited included the need to reach agreement between FAA and industry on safety risk mitigations, including desired performance levels for technology that enables UAS to automatically detect other aircraft operating in nearby airspace and successfully maneuver to avoid them,<sup>17</sup> as well as availability of dedicated communication channels between an unmanned aircraft and its control station or operator.<sup>18</sup> For example, one lead participant stated that while industry had begun work under IPP to identify such technologies that could adequately mitigate the risks of operating without visual observers, the value of drone operations would continue to be limited until this challenge was resolved. Agency representatives stated that the UAS industry plays an important role in developing needed standards, and also emphasized the challenges of assessing and approving these proposed operations with limited test data and a lack of mature technology to ensure safety.

---

## Planning, Data, and Organizational Challenges Limited the IPP's Success

FAA's IPP would have achieved greater success had the Agency performed better planning and reporting, such as establishing metrics to measure the program's success, clearly defining data requirements, and sharing program results more broadly. Further, the need to balance aviation safety and innovation and

---

<sup>16</sup> FAA established the *UAS Beyond Visual Line-of-Sight Operations Aviation Rulemaking Committee* (UAS BVLOS ARC) in June 2021. The committee issued its final report on March 10, 2022.

<sup>17</sup> Referred to as Detect and Avoid.

<sup>18</sup> Referred to as radio-frequency spectrum, which is important for ensuring UAS can operate safely and securely in the NAS and is necessary for detect and avoid and beyond visual line of sight capabilities.

organizational issues—such as working across different Agency offices and program staff turnover—challenged FAA’s ability to manage the IPP.

### **Gaps Existed in FAA’s Planning, Data Requirements, and Reporting Processes for IPP**

FAA followed an organized and documented process for the initial selection of lead participants. Within 9 days of the May 9, 2018, selection announcement, each lead participant had signed a memorandum of agreement with FAA formalizing its participation. By the following month, FAA held a 2-day meeting to share program guidance and procedures with the participants face-to-face. Four of the eight lead participants we asked believed Agency representatives provided generally sufficient information at the onset of the program. The Agency worked with each lead participant to review and refine their concept of operations, including preliminary operational goals. However, more than three-quarters of the participants and partners we interviewed (15 of 17) agreed that the Agency needed a more detailed plan, such as performance benchmarks, clearly-defined data needs, and participant roles. As a result, while most participants acknowledged improvements during IPP, many also indicated progress was slow.

**Lack of Specific Benchmarks.** FAA did not establish metrics or benchmarks by which to evaluate program success. For example, FAA did not define any performance minimums or operational milestones to guide Agency and participant efforts and track progress. According to FAA officials, the Agency’s intent was to not be overly prescriptive in its program plan and direction to allow operations to begin and to encourage participant innovation in their proposals. In its *Standards for Internal Control in the Federal Government* (Internal Control Standards),<sup>19</sup> the Government Accountability Office (GAO) states that for qualitative objectives, management may need to design performance measures that indicate a level or degree of performance, such as milestones. For example, one lead participant stated it is “absolutely necessary to provide benchmarks and key performance indicators to ensure that progress is made on programs like [IPP]; it holds industry, regulators, and jurisdictions accountable.” While agreeing that milestones would help guide their efforts, the Agency was concerned with their ability to mandate or enforce specific dates or other benchmarks.

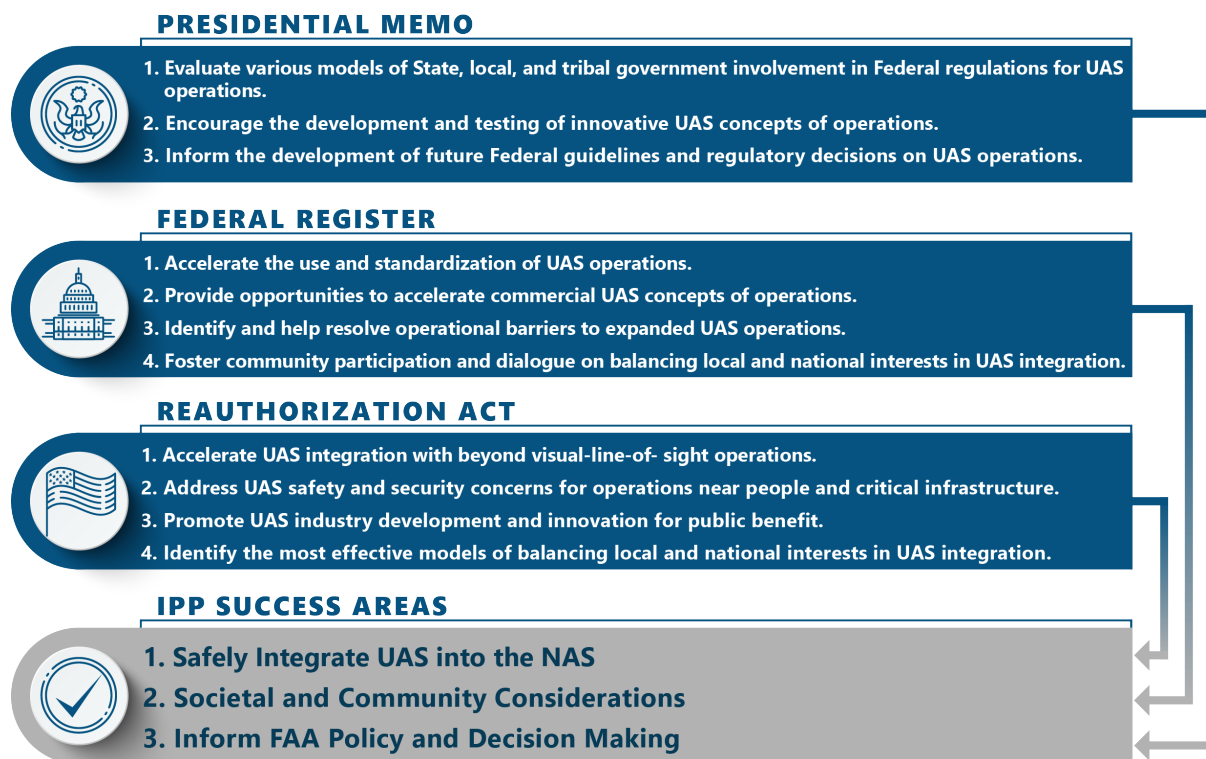
In May 2019, one year after signing agreements with the lead participants, FAA attempted to establish quantifiable success metrics (such as a certain number of flights conducted beyond visual line of sight and air carrier operator certificates issued), but never finalized or integrated them into the program. Instead, FAA combined 11 objectives from the IPP foundational documents into 3 qualitative

---

<sup>19</sup> GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G, September 2014.

“success areas” to report accomplishments (see figure 4). However, these success areas were broad and did not contain any more specific or measurable goals.

Figure 4. IPP Program Objectives



Source: OIG analysis of FAA information

FAA pointed out that the IPP was a collaborative pilot program intended to explore paths forward for UAS integration into the NAS, not a capital program with Federal funding. In addition, according to FAA, one of the program’s goals was to accelerate operations beyond visual line of sight and inform future efforts in this area, rather than fully achieving routine operations. However, FAA documentation presented to lead participants early in the program (in June 2018) stated that one of the IPP’s “goals and objectives” was to “Achieve Beyond Visual-Line-of-Sight Operations.”

**Lack of Clearly Defined Data Requirements.** The Federal Register Notice stated that FAA will use IPP data to advance the overall state of the industry, including the development of regulations that will increase routine drone operations, such as flights beyond visual line of sight. However, program participants experienced challenges with FAA’s IPP data requests and understanding how the Agency planned to use it. FAA clarified how it would use IPP data in an April 2020 meeting, but this occurred approximately 6 months before the end of the program. More than half of the lead participants we interviewed (five of nine) said

that FAA's lack of definition regarding operational and waiver safety case data was a challenge. For example, one participant wanted additional clarity on key terms for waiver safety cases, such as what constitutes an area being "sparsely populated," as well as what is an "appropriate distance" away from infrastructure during flight. According to FAA, the Agency determines acceptable parameters for these terms on a case-by-case basis during the waiver safety case review process.

Further, one of the few barometers by which to measure success were required participant annual reports showing the economic and safety benefits of operations. The agreements between FAA and the participants<sup>20</sup> suggested some metrics to use for those calculations, such as fuel and maintenance costs for the UAS operation as compared to conducting the mission previously. However, according to lead participants, FAA did not provide standardized criteria or methodology by which to make the economic benefit calculations. Our review found that FAA's instructions lacked formulas, analytics, and references for standardizing the submissions, and participants found the economic benefit calculation portion of the annual report process confusing and difficult to complete.

Six lead participants identified challenges in capturing and/or conveying this economic data, and three of the nine lead participants did not submit their annual economic benefit reports after the first year of the program. In January 2020, the Agency provided participants with additional information regarding the requested economic data. According to FAA representatives, the Agency ultimately told participants they did not need to submit the economic benefit report until their programs reached economic viability. However, FAA also acknowledged that none of the participants' operations reached economic viability by the end of the IPP.

**Lack of Clear Public Reporting Requirements.** FAA also did not have clear requirements on sharing program results, including lessons learned, to those outside the IPP, leading to concerns from industry and Congress related to program outcomes. In its Internal Control Standards, GAO relays that effective information and both internal and external communication are vital for an entity to achieve its objectives. For example, one lead participant stated in their final report, "It is critical that information learned from [FAA UAS integration] activities be shared to help advance the integration efforts as a whole." While the Federal Register Notice stated non-proprietary operational data should be shared, it was not clear who was responsible for doing so—FAA or the participants—or what information should be shared. As a result, both the Agency and lead participants

---

<sup>20</sup> Each lead participant entered into a memorandum of agreement with FAA in May 2018 for their participation in the IPP. Participants signed new agreements with FAA at the beginning of BEYOND in October 2020.



had different interpretations regarding this responsibility. FAA representatives also had differing recollections about what program data and/or reports FAA planned to share with the public.

In addition, although FAA compiled participant data into annual reports in 2018 and 2019 for submission to the President, as required, FAA only submitted the 2018 report. According to FAA, the 2019 annual report to the President was overtaken by Agency efforts to issue the final IPP report. FAA published the IPP Final Report on December 17, 2021. Further, FAA did not share the 2018 annual report sent to the President with the general public, and the Agency could not confirm it shared the report with lead participants or their operational partners.

Another area where IPP did not meet expectations is that FAA has not yet resolved the role of State, local, and tribal governments in the development and enforcement of Federal UAS regulations. One of the original IPP objectives from

the Presidential Memorandum was to test and evaluate various models of government involvement in these areas. This emphasis to identify the most effective models of balancing local and national interests in UAS integration was reinforced in the Reauthorization Act. However, the Agency did not make any determinations as to the most successful model for balancing those interests, which was a missed opportunity. FAA officials stated they did not receive enough information from participants to be able to evaluate different models. One lead participant attempted to address this issue with FAA. In 2018, the participant requested a clarification as to whether particular State laws regarding UAS conflicted with Federal regulations. According to FAA, as of February 2022, the Agency's review of this topic is still ongoing, and FAA has not yet provided an opinion in response to that request regarding potential preemption.<sup>21</sup> See figure 5 for additional comments from lead participants regarding balancing the roles of Federal and local governments in UAS policy. GAO also

### Figure 5. Challenges Resolving Federal and Local Government Roles

- Discussions with FAA regarding Unmanned Traffic Management\* as part of IPP were valuable, but the roles of state and local governments are still unclear.
- "Federal preemption over the risk of localities enacting takeoff, delivery, and or landing restrictions [for UAS package delivery] will be critical for facilitating the growth of the industry."
- "IPP was unable to achieve any time, manner, or place [i.e., Federal preemption] milestones, as set forth as an original objective."

Source: Lead Participant IPP Final Reports

*\*Unmanned Aircraft System Traffic Management (UTM) is a separate but complementary framework that will ultimately enable the management of low-altitude drone operations (i.e. under 400 feet above ground level) in airspace where FAA air traffic services are not provided.*

<sup>21</sup> Congress has provided FAA with exclusive authority (i.e., preemption) to regulate aviation safety, the efficiency of the navigable airspace, and air traffic control, among other things. State and local governments are not permitted to regulate any type of aircraft operations, such as flight paths or altitudes, or the navigable airspace.

noted the importance of clarifying preemption issues in a September 2020 letter to Congress.<sup>22</sup>

### FAA Faced Challenges With Balancing Safety and Innovation

FAA's historical focus on traditional aviation, along with limited existing regulations governing UAS operations, created challenges in administering a UAS testing program, given the complexity of proposed operations. According to program participants, this challenge resulted in risk-averse decision making and slowness to accept innovation. While generally acknowledging some shifts in the Agency during the 3-year program, lead participants and industry representatives expressed frustration with FAA's position on acceptable safety case justifications for complex waiver requests and its overall risk tolerance for UAS. See figure 6 for perspectives expressed by lead participants regarding FAA's challenge to balance ensuring safety with innovation as part of the IPP and UAS integration.

According to program participants, these factors contributed to delays in operational approvals and sometimes blocked progress entirely. For example, one lead participant expressed frustration that after more than a year of testing beyond visual line of sight operations under a waiver, FAA told them it could not approve any additional beyond visual line of sight operations without

#### Figure 6. Participant Comments Regarding FAA's Balancing Safety With Innovation

- "FAA often used the term '*crawl, walk, run*' to illustrate the speed at which progress would be made toward the new and innovative UAS operations including [beyond visual line of sight]. It appears we are still in the '*crawl*' stage of this journey."
- FAA has overly-risk averse tendencies when considering new and innovative concepts of operations which delays innovation.
- "If industry, participants, and the FAA can't work together to get to yes and accept risk, as long as it is mitigated,...then [everyone] will continue to struggle to meet the goals outlined during the development and application process of the FAA UAS IPP."
- "The overall FAA attitude towards...integration efforts has shifted over the course of the IPP, but the [participant] still needs to periodically push back on some [FAA] people who appear to be trying to stop the integration of unmanned aircraft into the NAS."
- "...Progress has been limited to operations continually being approved on a case-by-case basis for every waiver...there is no replicable processes or established operations that can be scaled [across locations] even if all mitigation factors and technology remains the same...."

Source: Lead Participant Final Reports

<sup>22</sup> GAO, *Unmanned Aircraft Systems: Current Jurisdictional, Property and Privacy Legal Issues Regarding the Commercial and Recreational Use of Drones* (GAO Report No. B-330570), September 16, 2020.

ground radar or other technology that did not yet exist. Seven of nine lead participants indicated FAA's inability or unwillingness to accept certain risk mitigations or new technologies hindered their ability to reach their program goals. In one instance, according to the lead participant, these issues caused a delay in FAA's approval of a rapid COVID-19-related operation needing a waiver and eventually prevented it from occurring. According to FAA, the Agency restricts or approves waivers based on meeting the target level of safety. However, FAA Flight Standards management acknowledged internal divisions and disagreements among Flight Standards personnel regarding allowable risk when approving new UAS operations, as well as the steps needed to advance UAS integration.

Lead participants also cited the challenge of incorporating potential broader safety benefits of UAS into FAA's assessment of aviation-specific risk. More than two-thirds of participants and partners we interviewed (12 of 17) stated that FAA, when reviewing their proposed operations and risk mitigations, did not appear to consider other safety benefits outside of the effect on the NAS. For example, one participant expressed frustration with FAA's safety risk management analysis approach when they presented a proposal for a UAS bridge inspection operation beyond visual line of sight. The operator told us that while FAA considered potential aviation-related risks, it did not consider information about risks removed by taking a human worker out of a dangerous situation. However, according to Office of the Secretary of Transportation (OST) officials, data does not yet exist that supports lowering a target level of safety for aviation based on assumed benefits for other modes. DOT officials also indicated they have not yet performed analysis or developed policy in this area. They are aware of efforts to quantify community benefits as part of BEYOND, and expected industry to address the issue as part of the beyond visual line of sight aviation rulemaking committee.<sup>23</sup>

### **Issues With Coordination Across Lines of Business and Staff Turnover Created IPP Management Challenges**

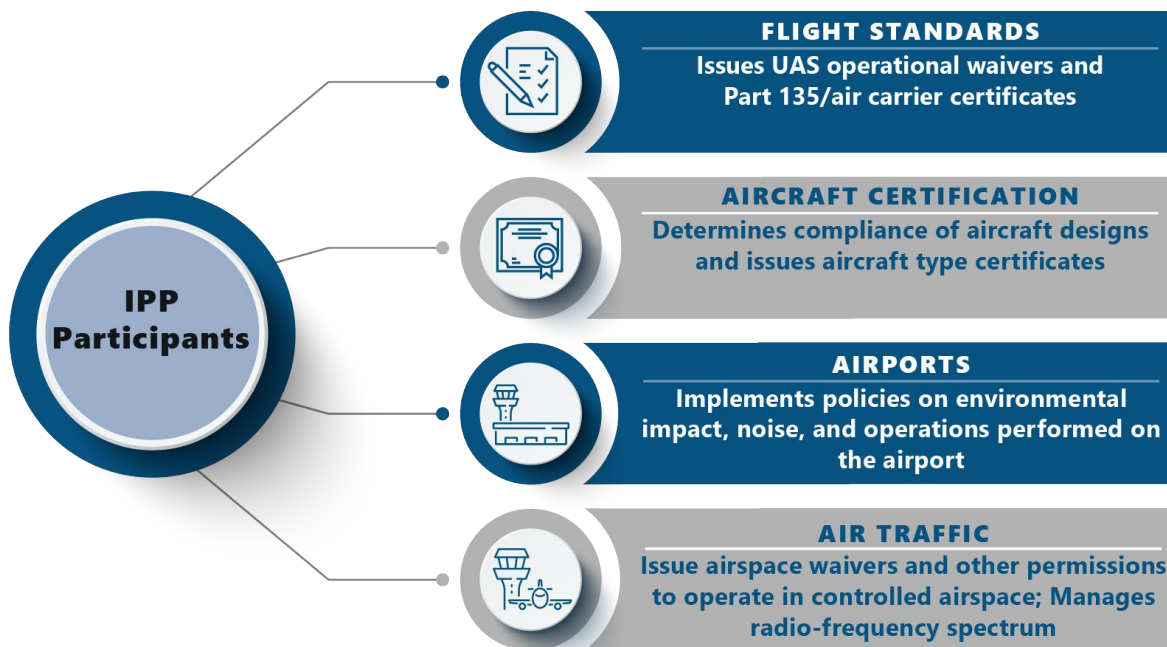
Organizational issues also contributed to participant frustration and program challenges. Under FAA's current organizational structure, the UAS Integration Office managed the IPP and is currently overseeing execution of BEYOND. While it is part of the Agency's Aviation Safety organization, the integration office serves primarily as a liaison and does not have authority to issue certificates, operational waivers, airspace authorizations, exemptions, or other approvals. As such, the integration office program managers must coordinate and share information with

---

<sup>23</sup> In its March 2022 final report, the committee recommended that DOT and FAA assess and evaluate societal benefits from operations beyond visual line of sight and consider categories and types of benefits that are not easily quantifiable, to ensure the full range of operations are captured and quantified as part of policy and regulatory initiatives.

multiple offices within other FAA lines of business (such as aircraft certification or air traffic) in order to facilitate IPP and BEYOND (see figure 7).

Figure 7. FAA Offices Involved in IPP/BEYOND



Source: OIG analysis of FAA information

To help facilitate access to appropriate lines of business, FAA provided dedicated program managers<sup>24</sup> to work with each lead participant. For example, six of nine lead participants specifically stated that the FAA program managers were a very positive aspect, and they valued how the program managers facilitated coordination with various FAA lines of business.

However, five lead participants expressed frustration with communicating and/or coordinating with multiple FAA lines of business as part of the IPP. For example, one participant noted FAA representatives would change their mind on a decision between meetings without explanation. Another participant observed that different FAA representatives from the same office or branch attended critical operational approval meetings but were not prepared for the subject of discussion. Additionally, according to 11 of 17 participants and partners we interviewed (65 percent), FAA was inconsistent in IPP waiver reviews and/or providing sufficient guidance to participants on their waiver safety cases.

<sup>24</sup> FAA called these State, Local, and Tribal Program Managers, and they supported 1-3 lead participants each at any given time. While they were serving in this program manager role, the FAA personnel in those positions worked for the UAS Integration Office and their primary function was to share information and coordinate between the lead participants and other FAA lines of business.

According to FAA, ultimately all IPP operational waivers were reviewed and signed by the same office, which ensured consistency across waivers. See figure 8 for additional participant comments about FAA’s organizational structure.

### Figure 8. Participant Comments on FAA’s Organizational Structure

- “Lack of investment on every level creates an apathy toward the program’s success. Without true buy-in from the FAA...in the sense of creating an office large enough to accommodate true innovation efforts, with more permanency, autonomy, and security...changes will not occur at [anywhere near] a remotely close enough pace to keep time with the...continued growth.”
- “There are many lines of business at the FAA involved in conversations when seeking advanced UAS approvals [and] it can be difficult to understand sometimes which appropriate FAA office is the risk acceptor of a particular issue....[as well as] that not all FAA lines of business are versed in advanced topics of UAS operations.”
- “Throughout [IPP], each of the approved...projects was affected by changes in IPP guidance and position on a variety of topics...the magnitude of these changes in some cases was far greater than expected, to the point of complete reversals on certain topics...The net effect was significant loss of time, resources, and effort that ultimately undercut the team’s ability to accomplish objectives that would have added [value.]”
- “Continuous progress towards full UAS integration into the [NAS] will require more consistent and effective management of program objectives and review processes.”
- “The process of working with the regulator through difficult challenges can be frustrating and time consuming....and [includes] working sessions that sometimes feel like no progress was being made...However, progress does seem to happen given enough time.”

Source: Lead Participant Final Reports

In addition, there was staff turnover in FAA’s UAS integration office throughout the program, including leadership personnel and program managers. All lead participants experienced some turnover of their FAA program managers over the course of the IPP, including two lead participants that had four different people serving in the role of FAA program manager each—one of which was in place for 6 months. All but one of FAA’s program managers<sup>25</sup> were on temporary assignment to the IPP. Three lead participants specifically expressed concern about FAA staffing or turnover in their final reports or in interviews with the OIG. For example, one lead participant noted in its final report that the UAS integration office “is a stepping stone or temporary placeholder for employees.” According to FAA, the time-limited nature of the program and the need to fill positions quickly were the driving forces behind the Agency’s use of temporary staff, and they do not have control over employees’ career opportunities. While FAA pointed to consistency among program support staff during IPP, several participants noted this turnover led to slowed progress and lack of continuity in decision making.

<sup>25</sup> One staff member who was hired permanently in October 2019 has continued as a program manager for BEYOND.

---

## FAA Incorporated Lessons Learned and Best Practices Into BEYOND but Has Not Resolved Challenges That Limited the IPP's Success

FAA integrated some lessons learned and best practices from the IPP into the planning and implementation of BEYOND. However, several other challenges for both the Agency and participants, such as how to include IPP and BEYOND operational experience into UAS rulemaking, remain unresolved.

---

## FAA Incorporated Lessons Learned and Best Practices Into the BEYOND Program Design

FAA included more details in the agreements signed by lead participants in BEYOND. For example, FAA and lead participant agreements now include a semi-annual program management review presentation from each participant to the Agency and requirements for participants to provide a program manager and resources dedicated to the program. In addition, FAA added performance-based standards<sup>26</sup> related to technical approvals in different environments that were not present in the IPP agreements, such as airspace considerations and solutions for detecting and avoiding other aircraft (see table 2 for selected requirements under the IPP as compared to BEYOND).

---

<sup>26</sup> FAA calls these standards Key Performance Indicators.

Table 2. Comparison of Selected Provisions of IPP and BEYOND Participant Agreements

Agreement Provision	IPP	BEYOND
<b>Participant Reporting</b>		
Quarterly & Annual Reports	X	
Initial Economic Baseline Reports (based on application data)	X	
Semi-Annual Reports (including <b>completed</b> Community Engagement and Societal and Economic Benefits Data)		X
Semi-Annual Program Management Review Presentations		X
Final Reports	X	X
Program Withdrawal Report		X
UAS Maintenance and Anomaly Reporting		X
<b>Participant Requirements</b>		
Notification to Local Community	X	X
Participate in Community Engagement Roundtables		X
Lead Participant Program Manager		X
Systems and Operations Data Key Performance Indicators		X
Participate in Societal and Economic Data Review Meetings		X

Source: OIG analysis of IPP and BEYOND Memoranda of Agreement between FAA and Lead Participants

In addition, based on lead participant and partner feedback during the IPP, FAA streamlined the operational data reporting requirements in the final year of IPP and for BEYOND. Five lead participants credited Agency staff for the steps taken to focus and simplify the information they needed to report. We found that FAA provided additional clarity on data definitions and requests, including economic benefit data. We also determined the Agency has narrowed the objective of BEYOND to focus on enabling routine beyond visual line of sight operations. Further, according to FAA, the Agency increased its data analysis and validation functions on participant reported flight and operations data as it moved into the program. For example, towards the end of the IPP and into BEYOND, FAA

personnel have implemented data cross-checks between sources to look for discrepancies in reported flight data.

Further, after the conclusion of the IPP and to update the aircraft certification process based on lessons learned, FAA issued a memorandum in July 2021<sup>27</sup> detailing a change to the UAS certification policy. The Agency's Flight Standards Service now has a role in the review and approval<sup>28</sup> of certain components of a UAS, such as software not attached to the aircraft, a role it did not have previously. According to an FAA representative, the Agency continues to work with industry to clarify the process and coordinating internally to determine the guidance needed to fully implement the revised policy.

Finally, FAA carried over two best practices from the IPP into BEYOND: dedicated Agency program managers for each lead participant, and structured community engagement efforts. FAA and lead participants took steps during the IPP to obtain community feedback on benefits and concerns related to UAS operations. In some cases, lead participant community outreach efforts during the IPP were linked to improved public safety outcomes. For example, one lead participant worked with local officials to monitor and provide imagery of bridges, roadways, and infrastructure during flooding events. These images were then used to make closure and re-opening decisions and to communicate with the public. As part of BEYOND, FAA included additional requirements for lead participants in the agreements, such as requiring submission of a community engagement plan and participating in community roundtables.

---

## **FAA Has Yet To Resolve Multiple Challenges, and the Effectiveness of Changes to BEYOND Are Uncertain**

Prior to the start of BEYOND, the Agency created a preliminary program plan to guide participant operations and FAA actions. Based on our review, the plan does contain more detailed metrics and some milestones. However, after more than a year, the program plan is still in draft. As such, it is unclear if this plan will adequately mitigate or resolve participant and industry challenges identified in and carried over from the IPP. Through agreements with participants, FAA created BEYOND as a 4-year program ending October 2024 and established semi-annual participant reporting checkpoints. However, the Agency has not yet

---

<sup>27</sup> Memorandum No. AIR-600-21-AIR-600-PM01; *FAA Approval of Unmanned Aircraft Systems (UAS) Special Class UA Projects and their Associated Elements*. July 13, 2021.

<sup>28</sup> FAA's Aircraft Certification Division still holds the primary role in certifying the unmanned aircraft system as a whole and issuing a type certificate; flight standards now will consult with aircraft certification on certain aspects.



finalized any other program milestones, nor have they provided detailed or quantifiable success metrics for the program. Table 3 below details FAA’s challenges faced under the IPP and their current status in the BEYOND program.

Table 3. Status of Selected IPP Challenges in the BEYOND Program

IPP Challenge	Status in BEYOND
Lack of finalized, quantifiable success metrics	FAA has not yet finalized quantifiable success metrics.
Lack of definitions and clarity regarding operational, safety, and economic benefit data	FAA has provided some additional clarity on data definitions and requests, including economic benefit data.
Limited progress on an IPP objective to test and evaluate models of government involvement at the State, local, and tribal level	FAA narrowed the objective of BEYOND to focus on enabling beyond visual line of sight operations, but continues to review the appropriate balance between State and Federal regulations separately.
Difficulty balancing between the need to ensure safety and approval of innovative and complex operations, resulting in participant perceptions of risk-averse decision making	Participants perceive that although FAA’s level of risk acceptance for UAS operations has started to increase, FAA needs to further shift to ensure proposed operations can be implemented.
Participant and industry partner concerns that FAA’s risk/benefit analysis did not appear to consider safety benefits to other modes of transportation outside the effect on the NAS, such as risk removed by taking a worker out of a dangerous situation	DOT stated cross-modal risk data does not yet exist and has not developed policy in this area, but work is ongoing in BEYOND and in a rulemaking committee to quantify community benefits.
FAA’s organizational structure and coordination with multiple FAA lines of business	FAA has not yet addressed the challenges of working across the various lines of business involved in UAS.
Staff turnover in FAA’s UAS integration office, including leadership personnel and program managers	BEYOND program staffing was initially a mix of permanent and temporary program managers, but FAA has since converted most temporary staff to permanent positions.

Source: OIG analysis of FAA data

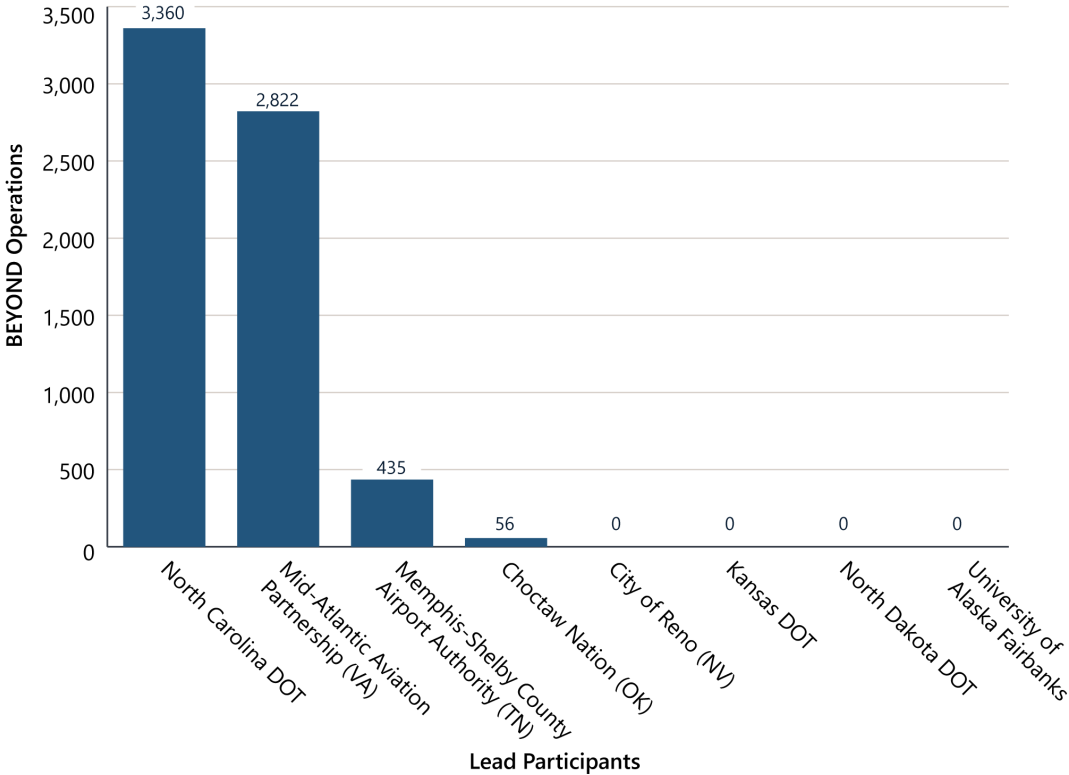
While FAA has provided information to participants in June 2020 about how the Agency intends to use BEYOND flight data, it has not yet shared the plan for analyzing economic viability.<sup>29</sup> Further, information on how FAA intends to use BEYOND flight data has not been consistently shared with the operator partners.

<sup>29</sup> FAA defines economic viability as the ability of the UAS operation to increase process efficiency while recognizing a significant return on investment over more traditional transportation methods to include societal, environmental, and community benefits.

For example, six of eight partners we interviewed did not know how the Agency was going to use the reported data. In June 2021, FAA formed an aviation rulemaking committee focused on UAS operations beyond visual line of sight, but it is not clear how the Agency will use any data IPP- or BEYOND-generated data to inform that rulemaking process. According to FAA, in August and November 2021 the Agency provided IPP community engagement best practices as well as flight totals from IPP and BEYOND in response to requests from the committee.

While the Agency has taken steps to streamline the data collection methodology, it is too soon to tell if its actions enhance the data analysis effort. Most lead participants had begun operations under the IPP within 5 months of their selection; however, as of November 2, 2021, only half of the lead participants had conducted operations under BEYOND (see figure 9). Participants and the Agency attributed this delay to factors including the COVID-19 pandemic, weather limitations, delays in obtaining waivers, and a shift in focus toward obtaining aircraft certification prior to beginning operations. According to FAA, lead participants and their partners are not all at the same level of readiness or capability to conduct UAS operations.

Figure 9. UAS Operations in BEYOND (as of November 21, 2021)



Source: OIG analysis of FAA data

According to the lead participants, FAA's challenges with balancing safety and innovation persist in BEYOND. Participants and partners we interviewed were concerned that although the Agency's level of risk acceptance for UAS operations has started to increase, FAA needs to further shift to ensure proposed operations can actually be implemented to meet program goals. Lead participants and industry partners we interviewed acknowledged the value of the Agency's role in ensuring safety. However, FAA's emphasis and regulations continue to be focused on traditional aviation. FAA management has acknowledged the need for a shift to better position the agency for UAS integration efforts. There is still a lack of specific regulations for certain UAS operations, and applying existing regulations to this new technology and operations has been difficult for the Agency.

Further, organizational issues have continued within the Agency as well. FAA has not yet addressed the challenges of working across the various lines of business involved in UAS, an issue OIG previously identified in 2014 and 2018 audit reports.<sup>30</sup> For example, Agency representatives we interviewed expressed concern that UAS operators in BEYOND currently working toward aircraft or air carrier certification will not be able to complete the process before the end of the program. Finally, some of the personnel filling the FAA program manager roles have continued to change between the IPP and BEYOND, and the temporary staffing model initially continued in the follow-on program. The Agency brought on three of its five program managers on a short-term, temporary basis—one of which was originally scheduled to end by October 2021. FAA has since made two of the program manager's positions permanent, and extended another program manager's temporary assignment through July 2022.

---

## Conclusion

Advancing UAS operations in the NAS continues to be one of the most complicated and fast-moving challenges FAA has faced in recent years. The Agency has acknowledged the unique technological and societal impacts and potential benefits of this new industry segment, and established IPP and BEYOND to perform tests and gather important data. However, industry continues to rapidly evolve and expand, which challenges the Agency to keep pace with these changes. UAS operators still need to obtain waivers for the most complex UAS operations, and FAA has not yet issued rulemaking to address operating UAS beyond visual line of sight. Further, work remains to clarify the processes and requirements necessary to obtain aircraft type certifications to enable commercial

---

<sup>30</sup> *FAA Faces Significant Barriers To Safely Integrate Unmanned Aircraft Systems Into The National Airspace System* (OIG Report No. AV-2014-061), June 26, 2014; *Opportunities Exist for FAA To Strengthen Its Review and Oversight Process for Unmanned Aircraft System Waivers* (OIG Report No. AV2019005), November 7, 2018.

operations using UAS. FAA's ability to achieve full and safe integration of UAS will require focused coordination and communication across the Agency to make data-driven decisions and promulgate new, robust safety standards.

---

## Recommendations

To improve FAA's use of UAS IPP results, including in its current program BEYOND, we recommend that the Federal Aviation Administrator:

1. Establish goals, milestones, and performance measures of success for the BEYOND program to guide and track Agency and participants' progress toward achieving beyond visual line of sight operations.
2. Communicate to BEYOND stakeholders how program operational, societal and economic benefit data will be used, analyzed, and shared to inform new policies, safety reviews, and rulemaking, including the rule for UAS operations beyond visual line of sight.
3. Implement a process to periodically assess the data collected during BEYOND—annually at a minimum—to determine if it is providing needed information and make adjustments as necessary.
4. Provide stakeholders and the general public with non-proprietary information related to BEYOND results via the FAA website or other appropriate means.
5. Identify intra-agency points of connection and lines of authority responsible for approving and integrating new UAS technologies, evaluate options to improve working across lines of business, and implement the best option based on the Agency's evaluation.
6. Evaluate the causes of IPP program manager turnover as well as the communication and transfer of knowledge, policies, and procedures to new program managers in the transition process, and implement actions to address those issues in BEYOND.

---

## Agency Comments and OIG Response

We provided FAA with our draft report on March 10, 2022, and received its formal response on April 7, 2022. FAA's response is included as an appendix to this report. FAA concurred with all six recommendations and provided appropriate actions and planned completion dates.

---

## Actions Required

We consider all six recommendations resolved but open pending completion of the planned actions.

---

## Exhibit A. Scope and Methodology

This performance audit was conducted between March 2021 and March 2022. We conducted this audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our audit objectives were to assess (1) the results of FAA's IPP and (2) FAA's plans for using those results, including how the Agency will incorporate them into its new program BEYOND. This report is in response to a request from the Ranking Members of the House Committee on Transportation and Infrastructure and its Subcommittee on Aviation.

Our audit covered the full 3-year period of the IPP (October 2017–October 2020), as well as the preparation, launch, and roll-out of the follow up program BEYOND (initiated in October 2020). To assess the results of FAA's IPP and how the Agency is using those results, including in the BEYOND program, we analyzed documentation and met with FAA representatives from multiple offices. Specifically, we obtained documents from and conducted interviews with managers and staff in the Flight Standards Service, Unmanned Aircraft Systems Integration Office, Aircraft Certification Division, Office of Aviation Policy and Plans, and the Office of the Chief Counsel. The FAA personnel we talked to had responsibilities related to IPP participant selection, program management, data gathering, guidance and policy.

We analyzed Federal regulations and documents, including IPP and BEYOND agreements, operations data, policies and guidance, meeting minutes, briefing slides and presentations, program overviews and summaries, as well as the Agency's IPP Final Report—which was issued after the conclusion of our audit field work in December 2021. We also reviewed documents relating to aircraft certification, a UAS rulemaking committee, and waiver safety evaluation criteria to gain information and understanding of other important UAS developments and challenges impacting the IPP and the Agency.

Further, we reviewed and analyzed Agency correspondence with and information from lead participants and private sector companies selected as partners, such as IPP applications, economic baseline reports, and IPP quarterly, annual, and final reports submitted by the lead participants. We also reviewed white papers and best practices documents published by the participants and/or their partners regarding experience gained in IPP.

We interviewed eight FAA personnel who served as IPP and BEYOND lead participant Program Managers. We also interviewed eight FAA, MITRE, and contractor analysts who supported IPP program managers and other staff. We also conducted an interview with representatives from OST to obtain the Department's perspective on risk assessment of UAS operations in the IPP and BEYOND. In addition, we interviewed representatives from all nine<sup>31</sup> IPP lead participants, eight private industry partners, and two UAS industry groups: Small UAV Coalition and Air Line Pilots Association.

To determine which private industry partners to contact, we obtained a list of IPP partners from FAA. We performed data accuracy checks on the list to identify redundant entries, and we took steps to validate the lists by requesting FAA and lead participant assessments of the list's accuracy and completeness. We conducted interviews with 8 of 232 UAS industry partners, selected based on if they supported more than one IPP participant, had obtained their air carrier certification, or were part of a random sample. We conducted these interviews to learn about their experiences as part of the IPP, their interactions with FAA, and lessons learned. We also attempted to contact additional operators from the random sample, but were unable to establish communication or interviews with several due to factors including personnel changes and outdated contact information. Our results from these interviews are not generalizable.

We obtained Agency documentation to verify information gathered from testimonial evidence. In addition, we assessed the reliability of FAA's IPP and BEYOND flight data records by reviewing processes for entering data into and extracting data from the electronic data repository; repository security and access controls; internal controls checking functions on data entry and analysis; and procedures for assessing data quality. This included both review of procedures manuals, and visual observation of the system functions and outputs.

---

<sup>31</sup> We did not contact representatives from the one original IPP lead participant that withdrew in early 2019.

---

## Exhibit B. Organizations Contacted

---

### DOT

Office of the Secretary of Transportation

---

### FAA

Aircraft Certification Policy and Innovation Division

Flight Standards Service

Flight Technologies and Procedures Division

General Aviation and Commercial Division

UAS Integration Office

Safety and Integration Division

Office of Aviation Policy and Plans

Office of the Chief Counsel

---

### Other Organizations – UAS IPP Lead Participants

Choctaw Nation of Oklahoma – *Oklahoma*

City of Reno – *Nevada*

City of San Diego – *California*

Innovation and Entrepreneurship Investment Authority (IEIA) / Mid-Atlantic Aviation Partnership (MAAP) – *Virginia*

Kansas Department of Transportation (KDOT) – *Kansas*

Memphis-Shelby County Airport Authority – *Tennessee*

North Carolina Department of Transportation (NCDOT) – *North Carolina*

North Dakota Department of Transportation (NDDOT) – *North Dakota*



## **Other Organizations – IPP Industry Partners**

FedEx

Flirtey

Flytrex

Iris Automation

Matternet

UPS Flight Forward

Wing

Zipline

---

## **Other Organizations – Industry Groups**

Small UAV Coalition

Air Line Pilots Association (ALPA)

---

## Exhibit C. List of Acronyms

ARC	Aviation Rulemaking Committee
BVLOS	Beyond Visual Line of Sight
DOT	Department of Transportation
FAA	Federal Aviation Administration
GAO	Government Accountability Office
IPP	UAS Integration Pilot Program
NAS	National Airspace System
OIG	Office of Inspector General
OST	Office of the Secretary of Transportation
UAS	Unmanned Aircraft Systems
UTM	Unmanned Aircraft System Traffic Management

---

## Exhibit D. Major Contributors to This Report

ROBIN KOCH	PROGRAM DIRECTOR
STEFANIE MCCANS	PROJECT MANAGER
R. ANDREW FARNSWORTH	SENIOR ANALYST
AIESHA MCKENZIE	SENIOR ANALYST
MANUEL RAMOS	AUDITOR
AUDRE AZUOLAS	SUPERVISORY SENIOR WRITER
CELESTE BORJAS	ATTORNEY ADVISOR
ALLISON DUKAVAS	WRITER-EDITOR
MAKESI ORMOND	STATISTICIAN
ANGELICA PEREZ	VISUAL COMMUNICATIONS SPECIALIST
SHAWN SALES	SUPERVISORY VISUAL COMMUNICATIONS SPECIALIST

---

## Appendix. Agency Comments



# Federal Aviation Administration

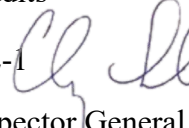
---

---

## Memorandum

Date: April 7, 2022

To: Nelda Z. Smith, Acting Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: FAA's UAS Integration Pilot Program

---

---

The integration of unmanned aircraft systems (now referred to as “drones” in accordance with 49 USC 44801) into the National Airspace System (NAS) is a high priority for the Federal Aviation Administration (FAA). The Integration Pilot Program (IPP) contributed significantly to agency integration efforts, but challenges remain. The FAA is working closely with the drone industry, proposed operators, and other stakeholders to identify and implement the necessary requirements for full integration into the NAS.

The FAA implemented the “BEYOND” program to focus upon one of the most significant barriers to full integration, safely enabling drone operations beyond visual line-of-sight (BVLOS). The BVLOS Aviation Rulemaking Committee (ARC) published a final report on March 10, 2022, and that report provides recommendations to address a wide variety of issues still requiring resolution. Many of the IPP and BEYOND participants are members of the BVLOS ARC.

The FAA offers the following comments in response to the draft report:

- It is important to understand that the IPP was an exploratory program focused upon new, innovative, and rapidly evolving technology and concepts of operation. The FAA is still in the learning phase of how to safely and fully integrate drones into the NAS.
- All IPP program participants were volunteers, and no funding was provided to conduct operations, provide data, or staff the IPP. The FAA utilized existing resources to quickly establish and staff the program, including temporary details from other parts of the agency.
- Success criteria were established for the IPP to track program progress toward its goals. However, due to the exploratory and voluntary nature of the program, along with a lack of existing data, the agency determined that quantitative metrics were not definable at the inception of the IPP. The FAA agrees that concrete goals and quantitative performance metrics are necessary to monitor progress toward the safe integration of BVLOS operations into the NAS.

Upon review of the draft report, the FAA concurs with the six recommendations as written and plans to implement the recommendations by December 31, 2022.

We appreciate this opportunity to offer additional perspective on the OIG draft report. Please contact H. Clayton Foushee at [Clay.Foushee@faa.gov](mailto:Clay.Foushee@faa.gov) if you have any questions or require additional information about these comments.

U.S. Department of Transportation  
Office of Inspector General

---

# Fraud & Safety Hotline

---

<https://www.oig.dot.gov/hotline>  
[hotline@oig.dot.gov](mailto:hotline@oig.dot.gov)  
(800) 424-9071

## OUR MISSION

OIG enhances DOT's programs and operations by conducting objective investigations and audits on behalf of the American public.



1200 New Jersey Ave SE  
Washington, DC 20590  
[www.oig.dot.gov](http://www.oig.dot.gov)