



November 2020

AVIATION SAFETY

FAA's Office of Aviation Safety Should Take Additional Actions to Ensure Its Workforce Has Needed Skills

Accessible Version

GAO Highlights

Highlights of [GAO-21-94](#), a report to congressional committees

Why GAO Did This Study

FAA's aviation safety workforce is vital to ensuring that the agency fulfills its mission to provide a safe and efficient national airspace system. With the challenges of a large number of potential retirements on the horizon and the introduction of new aviation technologies, FAA must ensure that safety inspectors and engineers possess skills needed for effective oversight as well as for a variety of highly technical skills in aerospace technology.

The FAA Reauthorization Act of 2018 included a provision for GAO to report on the workforce and training needs of AVS. This report addresses, among other things, the extent to which AVS (1) assesses competency gaps in its inspector and engineer workforces and (2) ensures its training program provides these workforces with needed competencies.

GAO analyzed AVS's workforce planning and training documentation, and interviewed officials from AVS and representatives from aviation industry associations and FAA labor groups.

What GAO Recommends

GAO is making two recommendations to FAA's Office of Aviation Safety to assess, on a recurring basis: (1) organization-wide competency gaps for its inspector and engineer workforces and (2) training curricula for these workforces. FAA concurred with the recommendations.

View [GAO-21-94](#). For more information, contact Heather Krause at (202) 512-2834 or Krauseh@gao.gov.

November 2020

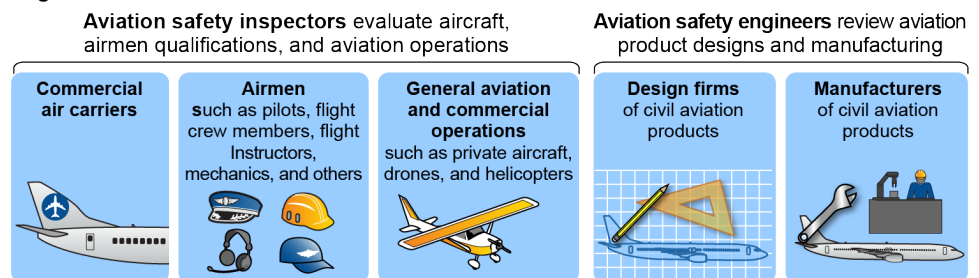
AVIATION SAFETY

FAA's Office of Aviation Safety Should Take Additional Actions to Ensure Its Workforce Has Needed Skills

What GAO Found

The Federal Aviation Administration's (FAA) Office of Aviation Safety (AVS) has started to identify the critical competencies (i.e., skills, knowledge, abilities, and behaviors) that its inspector and engineer workforces need to oversee the safety of the aviation industry, as described in the figure below; but it does not assess organization-wide competency gaps in these workforces on a recurring basis. AVS identified, for example, data analytics, systems thinking, and risk-based decision-making as competencies engineers need to perform safety oversight.

Responsibilities of Inspectors and Engineers for Overseeing Safety of Aviation Industry Segments



Source: GAO analysis of Federal Aviation Administration information. | GAO-21-94

AVS officials told GAO that managers in offices located across the country individually assess whether their respective employees have the skills needed to carry out their responsibilities. This approach does not provide AVS an organization-wide view of competency gaps. Performing recurring, organization-wide competency gap assessments is consistent with GAO's strategic workforce planning principles and federal *Standards for Internal Control*. Without information on the extent to which its inspectors and engineers possess critical competencies, AVS is limited in its ability to implement appropriate strategies for addressing organization-wide gaps in critical skills such as data analytics.

AVS takes steps to train inspectors and engineers on skills to carry out their safety work but has not assessed the office's training curricula on a recurring basis. Training for inspectors and engineers includes extensive introductory curricula covering general and job-specialty courses, recurrent training, and on-the-job training. AVS has policies for routinely evaluating individual training courses and incorporating improvements. However, it does not assess on a recurring basis whether the training curricula as a whole adequately provide employees with needed competencies. Recurring comprehensive reviews are consistent with key training guidance. Without recurring assessments of the curricula, AVS does not have the ability to identify whether there are gaps within the training, such as on oversight activities related to new technologies, or whether critical competencies necessary for carrying out its safety mission are being sufficiently emphasized.

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Abbreviations

COVID-19	Coronavirus Disease 2019
DOT	Department of Transportation
ESCP	Executive System Compensation Plan
FAA	Federal Aviation Administration
MPIP	Management Performance Incentive Program
NATCA	National Air Traffic Controllers Association
OJT	on-the-job training
OPM	Office of Personnel Management
OTS	on the spot
small UAS	small unmanned aircraft system
UAS	unmanned aircraft system
VP	Valuing Performance

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November 9, 2020

The Honorable Roger Wicker
Chairman
The Honorable Maria Cantwell
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Peter A. DeFazio
Chairman
The Honorable Sam Graves
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Federal Aviation Administration’s (FAA) aviation safety workforce is vital to ensuring that the agency fulfills its mission to provide a safe and efficient national airspace system. FAA’s Office of Aviation Safety supports FAA’s safety mission by overseeing almost 5,400 aircraft operators, over 290,000 registered manned aircraft, nearly 1,600 manufacturers, and others to ensure airline operations are safe and that aircraft are designed and manufactured to meet the standards for safe flight.¹ A majority of this oversight work is performed in the Office of Aviation Safety by mission critical workforces: aviation safety inspectors and engineers.²

The Office of Aviation Safety faces several challenges with its inspector and engineer workforces. First, a large number of inspectors and engineers will become retirement eligible and the office will need to prepare for potential changes within these workforces. According to the Office of Aviation Safety, by fiscal year 2025, between 52 and 62 percent of its inspectors and engineers will be eligible to retire. Second, the deployment of new technologies, such as those used in unmanned aircraft systems and aircraft manufacturing, demand that inspectors and

¹The Office is Aviation Safety is one of FAA’s four business areas (lines of business) that contributes to the agency’s goal of safe and efficient air travel.

²For our purposes, we refer to FAA aviation safety inspectors and aviation safety engineers as “inspectors and engineers.”

engineers are knowledgeable about these technologies. Third, FAA has changed how it conducts its safety oversight work, transitioning from an approach that used data from past safety events to identify problems and perform oversight, to a risk-based approach that uses aviation operations data proactively to identify emerging safety problems. As a result, the Office of Aviation Safety must ensure that inspectors and engineers possess both a variety of highly technical skills in aerospace technology as well as skills necessary for effective oversight such as risk management and data analysis. Fourth, we and the Department of Transportation's (DOT) Office of Inspector General have found that training for inspectors on a key component of FAA's safety oversight approach and small unmanned aircraft systems (small UAS) has lagged.³

We have identified strategic human capital management as a high-risk area for federal agencies, particularly because gaps in competencies—the skills, knowledge, abilities, behaviors, and other characteristics that employees need to successfully perform their work—can impede the government's ability to cost-effectively serve the public and achieve results. We have also reported that the changing nature of federal work and the high percentage of employees eligible for retirement—as with inspectors and engineers—could produce gaps in institutional knowledge and aggravate the problems posed by existing skills gaps. Our prior work on strategic workforce planning and assessing training and development efforts has identified key principles that can help agencies address these challenges. For example, developing hiring, training, and other strategies to address gaps in competencies can help agencies achieve current and future programmatic results.⁴

The FAA Reauthorization Act of 2018 included a provision for us to report on the workforce and training needs of the Office of Aviation Safety,

³An unmanned aircraft system is defined by law as an unmanned aircraft and its associated elements. A small UAS is defined by law as an unmanned aircraft weighing less than 55 pounds. For more information, see GAO, *Unmanned Aircraft Systems: FAA's Compliance and Enforcement Approach for Drones Could Benefit from Improved Communication and Data*, [GAO-20-29](#) (Washington, D.C.: Oct. 17, 2019) and Department of Transportation, Office of Inspector General, *FAA Needs To Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air*, AV2020013 (Washington, D.C.: Dec. 17, 2019).

⁴GAO, *Human Capital: Key Principles for Effective Strategic Workforce Planning*, [GAO-04-39](#) (Washington, D.C.: Dec. 11, 2003) and GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, [GAO-04-546G](#) (Washington, D.C.: Mar. 1, 2004).

including an analysis of the skills and qualifications required of inspectors and engineers, a review of current hiring requirements and performance incentive policies, and an analysis of how FAA works with industry and labor to establish knowledge-sharing opportunities, among other things.⁵ This report addresses:

1. the extent to which the Office of Aviation Safety assesses competency gaps in its inspector and engineer workforces,
2. the extent to which this office takes steps to ensure its training program provides inspectors and engineers with the needed position-specific competencies, and
3. how the office uses hiring tools to obtain employees in critical positions.

We also describe how the Office of Aviation Safety, industry, and FAA labor groups share knowledge of technological advancements in appendix I and how the Office of Aviation Safety uses performance incentives in appendix II.

The scope of our work focused on the Flight Standards and Aircraft Certification services because they have the most employees within the Office of Aviation Safety and because inspectors and engineers comprise a large percentage of their workforces.⁶ To address all objectives, we reviewed FAA, Office of Aviation Safety, Flight Standards, and Aircraft Certification policies, guidance, procedures, or other documentation pertaining to inspector and engineer workforce planning, skills, training, hiring, and performance incentives. For example, we reviewed the Office of Aviation Safety's most recent workforce plan,⁷ FAA's policy that describes the agency's process for developing competencies for hiring, and Flight Standards and Aircraft Certification guidance and procedures for training inspectors and engineers, developing new training courses, and evaluating existing training courses. In addition, we interviewed

⁵ Pub. L. No. 115-254, § 232, 132 Stat. 3186, 3257.

⁶According to the Office of Aviation Safety's most recent workforce plan, about 89 percent of all positions in the Office of Aviation Safety are in the Flight Standards and Aircraft Certification services. Inspectors and engineers make up 76 percent of the personnel in the two services. See Federal Aviation Administration, Office of Aviation Safety, *Aviation Safety Workforce Plan 2020-2029* (Washington, D.C.).

⁷Federal Aviation Administration, Office of Aviation Safety, *Aviation Safety Workforce Plan 2020-2029* (Washington, D.C.).

officials from FAA's Office of Human Resource Management, and the Office of Aviation Safety's Flight Standards and Aircraft Certification services, including officials from their workforce planning and development divisions, program offices that establish policies and standards, and Dallas/Ft. Worth offices.⁸ These officials discussed their processes for identifying the skills that inspectors and engineers need and those that they possess, assessing skills gaps, training and developing new courses for inspectors and engineers, evaluating existing training courses and curricula, using hiring-related authorities and other hiring tools, and using performance incentives, such as employee-recognition programs and pay-for-performance programs.

To obtain perspectives on the Office of Aviation Safety's inspector and engineer workforces, we obtained documentation and interviewed representatives from six industry associations, selected because of their interest in aviation workforce issues or to obtain perspectives from a variety of segments in the aviation industry.⁹ We also obtained documentation or interviewed representatives from an FAA research, engineering, and development advisory committee and two labor groups that we selected because they represent most of FAA's aviation safety inspectors and engineers who are in bargaining units.¹⁰

To assess the extent to which the Office of Aviation Safety identifies competency gaps, we compared the office's actions—as described in documentation and interviews—to key principles and guidance for effective strategic workforce planning and effective training and development, as well as *Standards for Internal Control in the Federal Government*.¹¹ We focused our analysis on those principles and guidance

⁸We met with a non-generalizable selection of inspectors and engineers at field offices in the Dallas/Fort Worth area to help inform the approach to our work. We selected this area because it has various types of Flight Standards and Aircraft Certification program offices, including a Flight Standards district office, a certificate management office, a manufacturing inspection district office, and others.

⁹The industry associations we selected are the Aeronautical Repair Station Association, the Aerospace Industries Association, the Aircraft Owners and Pilots Association, Airlines for America, the General Aviation Manufacturers Association, and the National Business Aviation Association.

¹⁰The FAA labor groups we selected are the National Air Traffic Controllers Association and the Professional Aviation Safety Specialists.

¹¹GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 2014).

that relate to identifying competency needs and gaps as well as using stakeholder input to inform workforce planning.¹²

To examine the extent to which the Office of Aviation Safety takes steps to ensure its training program provides inspectors and engineers with needed position-specific competencies, we interviewed officials identified above to obtain information on their policies for assessing inspector and engineer training curricula. We compared the curriculum assessment activities to key guidance on the importance of assessing training on a recurring basis for achieving program success.¹³

We conducted this performance audit from January 2019 to November 2020 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.

Background

FAA's Office of Aviation Safety sets the safety standards for and oversees every person and organization that manufactures and operates aircraft in the national airspace as well as every product used in this airspace. The Office of Aviation Safety's Flight Standards Service and Aircraft Certification Service (1) create and amend aviation safety standards and policies, (2) certify that aircraft, manufacturers, and individuals who operate aircraft meet safety standards, and (3) oversee

¹²[GAO-04-39](#) and [GAO-04-546G](#). In [GAO-04-39](#), we identify five key principles for workforce planning. Three of those principles relate to identifying competency needs, gaps, or using stakeholder input to inform workforce planning: (1) obtaining input from managers, employees, and other stakeholders to inform workforce planning; (2) identifying the critical competencies that agencies need to successfully achieve their mission and goals; and (3) developing strategies to address gaps and human capital conditions in critical competencies that need attention. In [GAO-04-546G](#), we describe four components for effective training and development. One of the components—planning/front-end analysis of training—relates to identifying competency needs and gaps.

¹³[GAO-04-546G](#). Also among the four components for effective training and development discussed in the 2004 report is the evaluation component, which describes the importance of assessing training on a recurring basis for achieving program success.

aviation safety through inspection. The two services carry out these responsibilities for different industry segments (see figure 1).

Figure 1: Examples of Industry Segments That the Flight Standards Service and Aircraft Certification Service Certify and Oversee



Source: GAO analysis of Federal Aviation Administration information. | GAO-21-94

Flight Standards and Aircraft Certification have program offices located across the country that perform the standards setting, certification, and oversight activities. The program offices focus on functional areas such as air carrier and general aviation safety assurance, safety standards, policy and innovation, compliance and airworthiness, and system oversight. Prior to 2017, Flight Standards’ program offices were geography-focused, and Aircraft Certification’s program offices were product-focused (e.g., small airplanes, rotorcraft, etc.). In 2017, both Flight Standards’ and Aircraft Certification’s program offices restructured into the present functionally focused program offices so that, according to the Office of Aviation Safety, their offices could better address emerging demands from the aviation industry and more consistently oversee their industry segments. For example, offices in Aircraft Certification reorganized from performing all the functions (e.g., compliance, production, and systems oversight) for one product (e.g., small airplanes) to overseeing one function (e.g., systems oversight) for all products (e.g., small planes, rotorcraft, etc.).

Flight Standards and Aircraft Certification also have workforce planning and training divisions. These divisions determine staffing needs; recruit

and hire employees; develop, refine, and monitor training; and support FAA’s pay-for-performance and employee-recognition programs. These divisions are assisted by FAA’s Office of Human Resource Management, which provides policies for human resource functions to include recruitment, employment services, and agency-wide workforce planning and development.

Inspectors and engineers in Flight Standards and Aircraft Certification support the Office of Aviation Safety in carrying out its responsibilities. At the end of fiscal year 2019, these services had about 4,760 inspectors and engineers who comprised more than two-thirds of the Office of Aviation Safety’s workforce.¹⁴ Inspectors work in both the Flight Standards and Aircraft Certification services. Most engineers work in the Aircraft Certification service. (See table 1.)

Table 1: Number of Inspectors and Engineers in the Office of Aviation Safety’s Flight Standards and Aircraft Certification Services, Fiscal Year 2019

Service	Number of aviation safety inspectors	Number of aviation safety engineers
Flight Standards	3,800	17
Aircraft Certification	236	706 ^a
Total	4,036	723

Source: GAO analysis of Federal Aviation Administration data. | GAO-21-94.

^aThe Office of Aviation Safety describes aviation safety engineers as including engineers, pilots, and chief scientific technical advisors.

The Office of Aviation Safety has an experienced inspector and engineer workforce and is taking actions to ensure that it maintains a pipeline of skilled employees to replace retiring employees, according to the office’s recent workforce plan.¹⁵ In the workforce plan, the office reported that it tends to hire experienced employees from industry. The Office of Aviation Safety, in conjunction with FAA’s Office of Labor Analysis, also reported that historically, a low percentage of its employees (about 7.5 percent) actually retire within a year of becoming eligible and 22 percent retire 10 or more years after becoming eligible. The office further reported that to strengthen the pipeline of candidates who will eventually replace retiring leaders, it is aggressively recruiting and hiring technically skilled

¹⁴Other positions in the Office of Aviation Safety include operational support staff and safety technical specialists.

¹⁵Federal Aviation Administration, Office of Aviation Safety, *Aviation Safety Workforce Plan 2020-2029* (Washington, D.C.).

employees at the entry level who can gain the knowledge and experience required to carry out the safety mission.

Inspectors and engineers in Flight Standards and Aircraft Certification belong to different occupational series¹⁶ and specialize in certain technical areas. Flight Standards' inspectors belong to the 1825 (aviation safety inspector) occupational series and primarily specialize in one of four areas: air carrier operations, air carrier airworthiness, general aviation operations, or general aviation airworthiness. For example, an inspector in Flight Standards who specializes in general aviation operations may be responsible for, among other things, certifying and surveilling aviation organizations and airmen that operate helicopters to ensure that they comply with regulatory requirements. Most of Aircraft Certification's workforce are engineers who belong to the 0861 (aerospace engineering) occupational series. These engineers may specialize in specific engineering disciplines such as airframe, propulsion, systems or software engineering.¹⁷ An engineer in Aircraft Certification may be responsible for, among other things, reviewing, analyzing, and evaluating whether aircraft design and electrical systems used on aircraft comply with regulations.

Flight Standards and Aircraft Certification currently use a range of competencies for hiring inspectors and engineers into specific positions, and each service uses a distinct set of competencies in their respective training programs. Because of the specialized nature of the work that many inspectors and engineers perform, the skills and knowledge that one position needs may be different from what another position needs. If managers who are responsible for hiring determine a certain position for which they are hiring requires specific skills or knowledge, they develop a vacancy announcement with position-specific competencies for that

¹⁶According to the Office of Personnel Management, an occupational series is a grouping of positions with a similar line of work and qualification requirements.

¹⁷Aircraft Certification also has a safety inspector workforce that focuses on product certification.

particular position.¹⁸ With regard to training competencies, the Flight Standards and Aircraft Certification services each develop and manage training programs for their respective workforces and each service has developed different sets of training competencies. Each service's training competencies describe the technical areas that their respective workforces should be trained in or will learn in a training course.¹⁹ These competencies include, for example, program certification,²⁰ safety management, and investigations.

The Office of Aviation Safety Has Started to Identify Critical Competencies but Has Taken Limited Actions to Enable Recurring Assessments of Organization-Wide Competency Gaps

Our key principles for effective strategic workforce planning and federal *Standards for Internal Control* call for agencies to identify the competencies their workforces need for mission success and to assess the extent to which employees possess these competencies on a recurring basis. Once an agency has determined where organization-wide gaps in these competencies exist, it can determine how best to address them, such as through hiring, training, or other strategies.²¹ We found that the Office of Aviation Safety has started to identify critical competencies that all inspectors and engineers need to address the agency's safety oversight activities, but does not perform recurring organization-wide

¹⁸The Office of Personnel Management establishes baseline qualification standards for occupations. According to Flight Standards officials, the service uses both position-specific competencies and OPM's qualification standards to assess candidates within the agency who have applied to vacancies, but uses only OPM's qualification standards to assess candidates from outside the agency who have applied to vacancies. Aircraft Certification officials said that they use position-specific competencies and OPM's qualification standards for all candidates.

¹⁹Aircraft Certification's training competencies also describe the non-technical areas, such as decision-making and communication, taught in a training course.

²⁰According to Flight Standards, program certification is the evaluation and on-going monitoring of an air carrier, operator, or certificate applicant's programs, personnel, facilities, record systems, and contracts for compliance with relevant regulations, guidance, and standards.

²¹[GAO-04-39](#), [GAO-14-704G](#).

competency gap assessments for these workforces. Without doing so, the Office of Aviation Safety is limited in its ability to implement appropriate strategies for addressing organization-wide competency gaps.

The Office of Aviation Safety Has Started to Identify Critical Competencies for Its Inspector and Engineer Workforces

In its fiscal year 2020 business plan, the Office of Aviation Safety included an effort to identify critical competencies—one set for inspectors and one for engineers—that will serve as a foundation for both hiring and training of these workforces. Key principles for effective strategic workforce planning and effective training and development state that agencies can benefit from identifying the critical competencies workforces need to successfully achieve their missions and goals, and linking these competencies to hiring and training offerings.²² The Office of Personnel Management (OPM) has likewise reported that agencies can use common competencies for a given occupation to provide a basis for integrating an agency's human resource management efforts, such as hiring and training.

Flight Standards and Aircraft Certification officials said that they wanted to develop critical competencies to consolidate the many competencies that currently exist for inspectors and engineers,²³ ensure that competencies for inspectors and engineers reflect changes in industry, or ensure that competencies reflect engineers' responsibilities under Aircraft Certification's new organizational structure.²⁴ According to these officials, the critical competencies will provide Flight Standards and Aircraft Certification a consistent set of skills, knowledge, abilities, and behaviors that all inspector and engineer positions will need to address current as

²²[GAO-04-39](#), [GAO-04-546G](#).

²³Flight Standards and Aircraft Certification currently use a range of competencies for hiring inspectors and engineers into specific positions given that the skills and knowledge that one position needs may be different from what another position needs. Each service also uses a distinct set of competencies in their respective training programs.

²⁴Aircraft Certification officials said that prior to its reorganization in 2017, engineers were located in one of several product-based program offices and that competencies were developed for engineer positions in each of these offices. When the service reorganized to be functionally based, officials said that most engineers were placed in a single program office that focused on the compliance and airworthiness function. Officials said that competencies common to all engineers were needed to better reflect the engineer workforce's work activities in one functional area, rather than multiple product areas.

well as future safety-oversight activities. Given recent technological advances in the aviation industry, the need for the Office of Aviation Safety to identify critical competencies based on current and future needs has likely grown more acute. See appendix I for information about how the Office of Aviation Safety, the aviation industry, and FAA labor groups share knowledge of technological advancements. As we discuss in the appendix, information on new technologies can influence the decisions that the office makes regarding competencies that inspectors and engineers need.

Officials said that they began their efforts to develop critical competencies in November 2019, starting with the engineering workforce. Officials from Aircraft Certification said that they gathered information from DOT, FAA, and offices across the Office of Aviation Safety on the different competencies used for engineers and consolidated them into one set of common competencies. The competencies for engineers, which the Office of Aviation Safety has finalized, include technical areas such as data analytics, systems thinking, project management, and risk-based decision-making as well as non-technical areas such as communication and stakeholder focus. Aircraft Certification officials said that some of the competencies they included, such as systems thinking, will help ensure that engineers have the skills needed to address technological advancements such as unmanned aircraft systems (UAS) and additive manufacturing (also called 3D printing). Officials said that by the end of fiscal year 2021, the Office of Aviation Safety plans to, among other things, compare the competencies to existing training courses for engineers to determine if there are any gaps, develop critical competencies for inspectors, and compare those competencies to training courses for inspectors. Aircraft Certification officials said that they would adjust vacancy announcements as needed to incorporate the competencies for engineers.

In addition to the Office of Aviation Safety's recent efforts, FAA's Office of Human Resource Management in 2018 began a strategic workforce planning effort to, among other things, identify skills that employees in the Office of Aviation Safety and across the agency may need in the future to respond to changes within FAA and the aviation industry.²⁵ As part of this effort, FAA leaders found that agency employees, including inspectors

²⁵According to the Office of Human Resource Management, changes within FAA include, for example, its use of a data-driven approach to decision-making and changes in the aviation industry include, for example, new entrants to the national airspace and the advancement of manufacturing technologies.

and engineers, will need skills in, for example, data analysis, project management, safety inspection, and information management. The office also assessed the potential effect that small UAS will have in the coming years on FAA's workforce. FAA found that inspectors, engineers, and other workforces that oversee small UAS may need certain skills to meet the demands of the future state for this industry, such as systems thinking and cybersecurity. In December 2019, the Office of Human Resource Management reported on hiring, training, and other strategies to help address needed skills. FAA officials said that the Office of Human Resource Management briefed the Office of Aviation Safety on its findings in June 2020 and plans to work with this and other offices across the agency on strategies to help ensure employees have needed skills. Officials from the Office of Human Resource Management also told us that they plan to perform analyses for industry segments or skill areas beyond small UAS, such as artificial intelligence, automation, or data analytics skills.²⁶ Separately, in October 2020, FAA asked the Safety Oversight and Certification Advisory Committee to examine and make recommendations on FAA and industry's future knowledge and skill needs. As part of this work, FAA asked the Committee to provide recommendations on, among other things, the knowledge and skills FAA, industry, and other aviation stakeholders need to address traditional and evolving regulatory roles and responsibilities. FAA also asked the Committee to identify opportunities for the mutual exchange of knowledge, experience, and skills between these groups.²⁷

²⁶In response to a provision in the FAA Reauthorization Act of 2018, we are conducting work separately on FAA's Office of Human Resource Management's workforce planning efforts, including how the Office of Aviation Safety and other offices within FAA are using the results of the Office of Human Resource Management's efforts. We plan to issue a report with the results of our work in early 2021. Pub. L. No. 115-254, § 232, 132 Stat. 3186, 3257.

²⁷The Safety Oversight and Certification Advisory Committee was established in March 2019 pursuant to section 202 of the FAA Reauthorization Act of 2018. Pub. L. No. 115-254, § 202, 132 Stat. at 3242-46. The Committee—which must be comprised of the FAA Administrator, representatives from industry, FAA labor groups representing aviation safety inspectors and engineers, and others—was directed to provide advice to the Secretary of Transportation on policy-level issues related to FAA safety oversight and certification programs and activities. FAA asked the Committee to provide recommendations on knowledge and skills needs, and knowledge sharing opportunities, to FAA no later than 12 months from the first meeting on the topics.

The Office of Aviation Safety Does Not Perform Recurring Organization-Wide Competency Gap Assessments

Key principles for effective strategic workforce planning state that agencies can benefit from assessing the extent to which employees possess critical competencies needed for mission success.²⁸ Assessing whether employees have such competencies on a recurring basis can help agencies ensure that they obtain a workforce with the necessary skills to achieve organizational goals, according to *Standards for Internal Control in the Federal Government*.²⁹ Furthermore, assessing organization-wide gaps in critical competencies on a recurring basis, and then addressing them through hiring, training, or other strategies can help agencies ensure that their workforces successfully achieve their missions and can adapt to demographic, technological, and other forces affecting their agencies.³⁰ In order to identify gaps, agencies can develop an organization-wide, consolidated inventory of the relevant competencies the workforce is thought to possess, conduct surveys of employees, or use other approaches.³¹ Information on competency gaps within a workforce can be used to help agencies prioritize future workforce investments.

We found that the Office of Aviation Safety does not collect information on the skills its inspector and engineer workforces possess in a manner that enables it to perform recurring, organization-wide competency gap assessments. Officials from Flight Standards and Aircraft Certification told us that managers in program offices located across the country individually assess whether their respective employees have the skills needed to carry out their responsibilities. Information from training records on courses taken or records on each employees' occupational series and position title are also sources of information that Flight Standards and Aircraft Certification officials said they use to identify the skills their employees possess. However, these approaches do not adequately reflect the range of competencies within a workforce. These approaches also do not provide the Office of Aviation Safety as a whole with an organization-wide view of whether there are gaps, and the extent of these

²⁸[GAO-04-39](#).

²⁹[GAO-14-704G](#).

³⁰[GAO-04-39](#).

³¹[GAO-04-546G](#).

gaps, in the competencies necessary to achieve the organization's mission.³² For example, without collecting information on the skills the inspectors and engineers possess and performing a competency gap assessment, the Office of Aviation Safety may not know the extent to which its workforces have gaps in advanced data analytics, which is a skill area the office has identified as necessary for its workforces to identify and assess safety risks.

Aircraft Certification officials said that they are planning to develop an inventory to collect information on the extent to which their workforces possess needed competencies, but they have no documented plan or timeframes for collecting this information on a recurring basis; Flight Standards officials said they do not collect this information. Specifically:

- Aircraft Certification officials stated that they are beginning discussions with FAA's Office of Human Resource Management on developing an inventory of competencies because they recognize that the information they currently collect on occupational series and position titles does not reflect the skills, experience, and knowledge that Aircraft Certification employees have. Aircraft Certification officials told us that the service has not, however, documented a plan or timeframes for how or when they will complete this work because discussions about an inventory are just beginning.
- A Flight Standards official responsible for workforce planning said his office does not collect information on the extent to which inspectors have needed competencies. This official told us that Flight Standards does not have a consolidated inventory of the competencies its inspectors possess because inspectors are hired with the competencies they need to perform their work.

³²In 2016, DOT completed competency gap assessments for mission critical occupations, including inspectors and aerospace engineers. Although we found some overlap between the competencies DOT used in its gap assessment of aerospace engineers—which make up most of the Office of Aviation Safety's engineers—and the critical competencies that the Office of Aviation Safety recently identified for engineers, we found that DOT's assessment did not explicitly include all of the critical competencies identified by the Office of Aviation Safety. As a result, DOT's assessment does not provide the Office of Aviation Safety information on the extent to which aerospace engineers possess all of these critical competencies. DOT officials said they completed another department-wide competency gap assessment in September 2020 for mission critical occupations including inspectors and engineers across DOT. We are reviewing DOT's competency gap assessments as part of work we are separately conducting on DOT's automated workforce. We plan to issue a report with the results of our work by the end of 2020.

Without information on the extent to which its inspectors and engineers possess critical competencies, the Office of Aviation Safety is limited in its ability to implement appropriate strategies for addressing organization-wide competency gaps in its workforce. For example, without knowing the extent to which its inspector and engineer workforces have gaps in advanced data analytics, the Office of Aviation Safety may not know the extent to which it should hire or train employees with this skill set. Furthermore, Flight Standards and Aircraft Certification may not be able to effectively leverage the existing competencies that its inspector and engineer workforces have to conduct the office's safety oversight mission.

The Office of Aviation Safety Takes Steps to Train Inspectors and Engineers on Needed Skills but Does Not Assess Its Training Curricula on a Recurring Basis

The Office of Aviation Safety Provides Introductory, Recurrent, and On-the-Job Training

The Office of Aviation Safety provides inspectors and engineers introductory, recurrent, and on-the-job training on skills they need to carry out their safety work. This training supplements the abilities inspectors and engineers bring with them from their education or previous aviation careers. Training documentation we reviewed shows that a range of topics are covered, from federal aviation regulations and inspection and investigative techniques to technical skills such as flight simulator training for operations inspectors. Within Flight Standards and Aircraft Certification, training divisions are responsible for providing required training for inspectors and engineers, according to documentation of training processes we reviewed and interviews with officials.

- **Introductory training.** Both Flight Standards and Aircraft Certification have extensive training curricula for new employees. Flight Standards requires that recently hired inspectors receive on average about 168 hours of web-based training and about 448 hours of classroom training within their first 12 months. This training contains courses pertaining to foundational knowledge that most inspectors will need, such as FAA's safety management system and automation tools. The training also contains courses targeted to inspectors' job specialties like general aviation aircraft maintenance programs or air carrier safety assurance programs. According to a Flight Standards district office official, the goal of the extensive introductory training (including on-the-job training as described below) is to enable new inspectors to work independently by the end of their first year.

Similar to Flight Standards, Aircraft Certification requires that new inspectors and engineers complete about 100 hours of initial introductory training courses within their first 24 months as well as

mandatory and position-essential courses.³³ The training contains three courses covering general topics about Aircraft Certification's mission as well as technical topics such as the process for certifying the safety of new aircraft and an introduction to designees and delegated organizations.³⁴ Aircraft Certification's mandatory and position-essential training curricula is determined by an employee's specific job specialty, such as the safety engineer curriculum and flight test/pilot engineer curriculum. For example, the safety engineer curriculum includes courses on project management, aircraft certification tasks, and fundamentals of airplane systems. Other curricula, such as the designee management training program, include courses for engineers and inspectors who oversee companies with organizational designation authorization, such as compliance auditing and managing engineering designees.

- **Recurrent training.** Both Flight Standards and Aircraft Certification provide recurrent training and identify training needs for their employees as part of an annual request for training. During the request for training, front line managers in program offices determine the training courses their staff needs during the upcoming year. These courses can include required training, employee-requested training, and training that managers have identified as being needed to address employee deficiencies in particular skills or knowledge. The respective training divisions compile the training requests in FAA's electronic learning management system and develop the annual training budgets and schedules.

Flight Standards inspectors have recurrent training requirements specific to their specialty and job function, including some courses that directly affect FAA's safety mission. For example, aviation safety inspectors specializing in air carrier airworthiness are required to take courses about how to identify unapproved airplane parts and emergency evacuation equipment. Flight Standards policy requires that managers identify training for their staff annually. According to

³³Aircraft Certification's training catalog describes mandatory training as training that is required by an internal order or policy and position-essential training as technical training that is essential for performing a job function or task.

³⁴Designees and delegated organizations are private persons or organizations to which the Office of Aviation Safety assigns the authority of performing functions on behalf of FAA's Administrator. Such designees and delegated organizations are authorized by law to examine, test, and make inspections necessary to issue airman or aircraft certificates. Flight Standards and Aircraft Certification inspectors and engineers monitor the designee program to ensure it is operating effectively.

officials, Flight Standards requires employees to complete recurrent training courses every 3 to 5 years.

Aircraft Certification officials stated that recurrent training courses are required only for its flight-test pilot engineer workforce. These courses include aircraft-crew resource management, physiological training, and night-vision pilot training. Managers may also identify position-essential or development courses for test pilot engineers or other employees during the annual request for training.

- **On-the-job training.** Flight Standards has an on-the-job training (OJT) program that all inspectors must complete. The program is taught by certified trainers and, according to Flight Standards' officials, is a way to assure that inspectors acquire the knowledge and ability to perform specific work required of their position. OJT is conducted in a progressive fashion, where the inspector first obtains basic knowledge of a job task (e.g., monitoring an aircraft operator's refueling operation or inspecting an aircraft cabin) such as through a training course, then observes the task being performed by another inspector, and finally performs the task independently. Successfully completing the OJT program is required for new inspectors. Flight Standards records trainees' OJT plan, progress, and completion in an electronic database called the Program Tracking and Reporting Subsystem. Aircraft Certification does not have an OJT program that is required for all engineers and inspectors, although officials stated that local managers may provide OJT informally. Aircraft Certification officials stated they are considering developing a standardized OJT program because the current OJT approach does not lend itself to developing quality national data on the OJT that employees receive. Officials said that a formal OJT program may help them create linkages between OJT and employee qualifications.

Both Flight Standards and Aircraft Certification use FAA's electronic learning management system to track completed training; FAA reports

that it is taking steps to improve this system.³⁵ In addition, an FAA order requires Flight Standards inspectors to obtain an aviation safety inspector credential (called a Form 110A credential) that indicates they are qualified to perform official inspector duties. In order to receive their credentials, inspectors must complete introductory and on-the-job training. FAA managers review inspectors' training records to ensure that they completed the requirements prior to issuing the credentials.

The Office of Aviation Safety Develops Training Courses in Response to New Regulations and Technologies

Both Flight Standards and Aircraft Certification have a process for developing new training courses when a need is identified by program office managers. Flight Standards and Aircraft Certification officials told us that they create new training courses for inspectors and engineers when managers identify a skill or knowledge gap that results from, for example, new regulations or technologies. The program offices send requests for new training to the training divisions who collaborate with the program office's subject matter experts and others to assess whether a skill or knowledge gap exists and whether it can be addressed by the current curriculum, a new training course, or some other method (e.g., one time training, checklists, or other job aids). According to Office of Aviation Safety officials, training divisions generally wait to assess requests for new training until a regulation is final because it is difficult to predict what the final rule will look like and whether it will necessitate new training. However, program offices may provide inspectors and engineers with guidance, such as advisory circulars, as needed during the rulemaking process. Once the training divisions determine a new training course is the appropriate course of action, they form course development

³⁵The U.S. Department of Transportation's Office of Inspector General published a report in December 2019 on FAA's oversight of the maintenance program of Allegiant Air, an ultra-low cost airline. Among its findings, it reported that a few FAA inspectors who oversee Allegiant Air's aircraft maintenance program did not complete internally required training and that some supervisors were not aware of the training requirements. The Inspector General recommended that, among other things, FAA develop and implement policies to monitor training requirements. FAA officials told us that in October 2020, they provided documentation to the Office of Inspector General to demonstrate that they had implemented the recommendation. Given the Inspector General's review and findings, we did not evaluate the extent to which FAA accurately monitors training requirements and course completion. Department of Transportation, Office of Inspector General, *FAA Needs to Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air*, AV2020013 (Washington, D.C.: Dec. 17, 2019).

teams to steer the development process. Examples of two recent requests for new training are provided below:

- According to an official in the training division, program managers in Flight Standards' General Aviation and Commercial Division³⁶ found that its inspectors were unable to properly inspect and certify agricultural operations that were using drone aircraft (also referred to as UAS) because inspectors lacked information about how to apply agricultural surveillance requirements and determine means of compliance. Program managers requested a course that would provide the necessary knowledge for applying regulatory requirements for operating drones for agriculture surveillance purposes. The Flight Standards' training division determined that the existing training course did not address this need and updated the course content, including adding a drone example, to be more informative about the application of surveillance techniques to agricultural drones.
- In Aircraft Certification, program managers recently contacted the training division to request inspector training on how to apply performance metrics for auditing engineering and production safety systems in response to a requirement in the FAA Reauthorization Act of 2018.³⁷ According to officials, FAA will implement this section by having Aircraft Certification develop a new course in systems oversight and track its implementation across FAA employees. Officials reported that it plans to begin its course development efforts by the end of December 2020.

According to Office of Aviation Safety officials, not all proposals should be addressed with new training, and, in some instances, other means, such as revising a current course or developing a job aid or a one-time web cast, may be a more appropriate response. The Office of Aviation Safety

³⁶The General Aviation and Commercial Division is responsible for regulations and policy development governing the training, certification, inspection, and surveillance of general aviation airmen, flight instructors, pilot schools, and commercial operations (e.g., rotorcraft, agricultural), among others.

³⁷The FAA Reauthorization Act of 2018 directs the FAA to work with the Safety Oversight and Certification Advisory Committee to establish performance objectives for the FAA and the aviation industry related to aircraft certification, as well as apply and track performance metrics for the FAA and aviation industry. Pub. L. No. 115-254, § 211(a), 132 Stat. at 3246. The Act requires FAA to establish performance objectives for aircraft certification to ensure progress is being made toward eliminating delays, increasing accountability, and achieving full utilization of delegation, while maintaining leadership of the U.S. in international aviation. The findings will be publicly available on the FAA's website.

uses a variety of modes to deliver training, including classroom instruction, online courses, webcasts, or a blend of approaches.

The Office of Aviation Safety Evaluates Individual Training Courses but Does Not Assess Curricula on a Recurring Basis

Flight Standards and Aircraft Certification have policies for routinely evaluating individual training courses and incorporating needed updates and improvements. Key training guidance states that routinely evaluating courses is an important practice that helps remove obstacles to successful implementation of an agency's training efforts by identifying potential problems and addressing them through course refinement or redesign.³⁸ Our review of these policies showed that they require end-of-course evaluations to be completed by students, instructors, and supervisors; observer-completed course evaluations;³⁹ and annual course evaluations that are completed by training managers or subject matter experts. In Aircraft Certification, the policy requires that training managers and subject matter experts serve as monitoring teams for each course and review course evaluation data. The teams also identify course content that is affected by changes in policy or job requirements, among other things, and ensure that content is updated as needed. Flight Standards officials said that prior to 2018 they reviewed courses every 3 years. In 2018, they began annual reviews of the courses they planned to teach in the following fiscal year. As part of their review of each course, subject matter experts review course evaluations and training requests, as well as the course content to validate that the information is accurate and can be delivered. If a course needs revision, it is completed before the course is taught. Flight Standards officials said that every quarter, they also verify that its new hire training curricula for each specialty accurately reflect required training.

The Office of Aviation Safety's current approach to training evaluation does not, however, include a recurring assessment of whether its entire training curricula adequately address the position-specific competencies its inspector and engineer workforces need for mission success. Key

³⁸[GAO-04-546G](#).

³⁹Aircraft Certification uses course observations to evaluate instructor-led courses. Course observations, which evaluate the currency and effectiveness of the course, are completed by course managers, program managers, training analysts, and others.

training guidance indicates the importance of agencies conducting reassessments of their training curricula on a recurring basis.⁴⁰ These reassessments can help ensure that training efforts are aligned with the competencies an agency's workforce needs to achieve current and future agency goals. Although neither Flight Standards nor Aircraft Certification currently perform recurring assessments of their training curricula, officials from both offices have acknowledged the value of a more holistic approach to evaluating their curricula and have begun taking steps in this direction.

First, Flight Standards officials stated that they have recently initiated a review of the new hire-introductory curricula because they want to more fully incorporate cultural change toward a safety mindset, and take advantage of new technology and training methods. Officials stated that in response to drastic cultural changes in safety oversight over the past 10 years, they have woven principles such as critical thinking and consistency, along with a mutual-learning mindset,⁴¹ into individual courses. Officials reported that Flight Standards wants a more holistic approach to the new-hire training program. For example, instead of simply introducing these concepts in training, officials want to incorporate them into tasks newly-hired inspectors will perform. Further, the technology related to training delivery methods has evolved to the extent that officials said they need to adapt more in-person courses to virtual learning. A Flight Standards official said they have accelerated the pace of delivering courses virtually as a result the Coronavirus Disease 2019 (COVID-19), and they expect the evaluation to be completed and the new curriculum to be in place for fiscal year 2021. However, Flight Standards officials told us they do not have plans to conduct recurring reviews of the new hire curricula. Nor do they plan to initiate reviews of their specialty training curricula, such as general aviation airworthiness or air carrier operations.

Second, in January 2020 Aircraft Certification created two new temporary positions that will be responsible for conducting an overarching review of the inspector and engineer training curricula. Called portfolio managers, these positions will be filled by an experienced aviation safety inspector and aviation safety engineer on a 2-year detail. The portfolio managers

⁴⁰[GAO-04-546G](#).

⁴¹According to Flight Standards' officials, the agency is taking steps to adopt a mutual-learning culture. Mutual learning is a mindset based on a set of core values, assumptions, and behaviors that lead to a culture of transparency, curiosity, informed choice, and accountability.

will be charged with reviewing curricula, validating the currency of existing courses, determining content gaps, and recommending strategies for closing them, among other activities. According to Aircraft Certification officials, the impetus for this review was to create a more effective method for ensuring training curricula were current. They also intend to revise course content in a more timely and proactive manner. In addition, officials said current training division personnel, such as training managers, while capable of completing their primary duties (e.g., course evaluations, revision, and development), lack expertise in engineering and inspector specialties needed to assess overall training content and requirements.

Aircraft Certification officials told us that an effective review of training curricula would best be done by a team consisting of the portfolio manager, training manager, and program office subject matter experts. Such a team should have the technical knowledge and experience to look across a series of courses and identify training gaps. Aircraft Certification officials told us that they interviewed candidates for the portfolio manager positions in September 2020 but had not yet filled the positions as of mid-October 2020.

Although these recent efforts to review training curricula by Flight Standards and Aircraft Certification are positive steps, they are one-time efforts. Furthermore, the current practice of assessing individual course content, in isolation from the other content included in a given curriculum—and without aligning training to competencies—would limit the Office of Aviation Safety’s ability to identify gaps in the training. Without assessing the curriculum as a whole on a recurring basis, the Office of Aviation Safety does not have complete information on whether critical competencies are being sufficiently emphasized. For example, without recurring curricula assessments, the Office of Aviation Safety may not know whether training courses across training specialties similarly address oversight activities related to new technologies.

The Office of Aviation Uses Hiring Tools to Recruit and Hire Inspectors and Engineers

The Office of Aviation Safety has faced challenges with hiring inspectors and engineers. According to the Office of Aviation Safety, the office fell short of meeting its staffing targets for inspectors by 4 to 6 percent from

fiscal years 2017 through 2019.⁴² According to Flight Standards, it has faced challenges meeting targets for inspectors in the air carrier operations and general aviation operations specialties in particular because of difficulty in finding qualified applicants and industry shortages in occupations, such as pilots, that apply to positions in these specialties. In addition, officials from Aircraft Certification said that they face shortages in engineers because they, like other offices in FAA, are competing with industry for these employees. These challenges may evolve for the Office of Aviation Safety as the aviation industry reduces its workforce in response to COVID-19.

To help address its hiring challenges and meet its staffing targets, the Office of Aviation Safety has used tools such as hiring-related authorities, as discussed below, to recruit and hire inspectors and engineers for certain positions that are hard to fill or are urgently needed.

- **Hiring for inspectors.** According to FAA, in December 2018, the Office of Aviation Safety began to use two hiring-related authorities—on-the-spot hiring authority⁴³ and authority to offer

⁴²To develop staffing targets, the Office of Aviation Safety uses staffing models to forecast its inspector and engineer workload and obtains input on staffing needs from managers and subject-matter experts from the office. DOT's Office of Inspector General and the National Research Council have raised concerns about the Office of Aviation Safety's staffing model. For example, in June 2013, DOT's Office of Inspector General reported that FAA lacked a reliable model for determining the number of inspectors that Flight Standards needs and made several recommendations to help enhance the effectiveness of the model. See Department of Transportation, Office of Inspector General, *FAA Lacks a Reliable Model for Determining the Number of Flight Standards Safety Inspectors It Needs*, AV-2013-099 (Washington, D.C.: June 20, 2013). Since June 2013, the Office of Aviation Safety has made changes to its model. In March 2020, in response to a provision in the FAA Reauthorization Act of 2018, DOT's Office of Inspector General initiated another review of the staffing model. The FAA Reauthorization Act of 2018 required a review that assesses, among other things, changes that FAA made to the model and the assumptions and methodologies used to predict the number of inspectors. Pub. L. No. 115-254, § 303, 132 Stat. at 3261.

⁴³Section 347 of the Department of Transportation and Related Agencies Appropriation Act, 1996 directed FAA to develop and implement its own personnel management system addressing the unique demands of the agency's workforce, and also exempted the to-be-developed personnel management system from many provisions of Title 5 of the United States Code that, in part, relate to hiring authorities. Pub. L. No. 104-50, § 347, 109 Stat. 436 (1995) (codified at 49 U.S.C § 40122). Pursuant to the authority granted under Section 347, FAA created a personnel management system in 1996, and established "on the spot" (OTS) hiring authority as outlined in FAA's Human Resource Policy Manual EMP 1.26.

higher salaries for entry-level positions⁴⁴—to help make timely hiring offers and reduce a staffing shortfall for inspectors in the air carrier operations and general aviation operations specialties within Flight Standards. These authorities enable Flight Standards to expedite hiring by, for example, extending job offers on the spot, such as at recruitment events, and to offer new-hire inspectors a salary that is 5 percent above the market median salary. These authorities related to hiring have been effective in helping to hire entry-level inspectors at a faster rate, according to Flight Standards officials. These officials said that Flight Standards hired 54 more inspectors in the operations specialties from December 2018 through April 2020 than from August 2017 through November 2018 before they began using the authorities.⁴⁵ Flight Standards officials also said because of their use of the authorities, fiscal year 2020 will be the first time in 5 fiscal years that the Office of Aviation Safety will meet staffing targets for inspectors.

- **Hiring for engineers.** According to FAA policy, the agency uses its on-the-spot hiring authority to fill certain science, technical, engineering, and mathematics and cybersecurity positions where OPM identified severe shortages, critical hiring needs, or both.⁴⁶ According to officials from the Office of Human Resource Management, in September 2019, FAA expanded this hiring authority to include additional engineering occupations in the agency, including those in Aircraft Certification. Officials from Aircraft Certification said that they used this authority to help them hire and address the shortage in their engineer workforce. The

⁴⁴An agency has the discretion to pay a newly appointed employee above the minimum rate for the grade to which he or she is being appointed if the new appointee possesses superior qualifications and the special needs of the agency will be met. 5 C.F.R. § 531.212 (issued under the authority of 5 U.S.C. § 5333). This is the authority that was used to authorize elevated pay setting for inspectors in the operations specialties.

⁴⁵The officials said that as of September 2020, they had hired 105 inspectors specializing in air carrier and general aviation operations using the on-the-spot authority and 147 inspectors in these specialties using higher salaries.

⁴⁶FAA's Human Resource Policy Manual EMP 1.26 establishes FAA's policy regarding the use of on-the-spot hiring when it is determined that there is a severe shortage of candidates, a critical hiring need, or when an individual meets the requirements for a special appointing authority. FAA's Human Resource Policy Manual EMP 1.26(a) expands FAA's on-the-spot hiring authority to include the majority of the STEM occupational series and grade levels currently authorized by OPM due to the severe shortage of qualified candidates and/or critical hiring needs.

officials said that by the end of fiscal year 2020, 47 general or aerospace engineers had been hired using this authority.

Flight Standards and Aircraft Certification also use other tools, such as relocation and other incentives, to help recruit and hire inspectors and engineers, according to officials in these services, including the following:

- In August 2019, Flight Standards began offering a relocation benefit of \$10,000 with a 1-year service agreement to inspectors specializing in operations who were moving more than 100 miles to the offered duty location. As of September 2020, FAA officials said that 65 inspectors had accepted this benefit.
- In January 2020, Flight Standards began to offer a \$10,000 recruitment bonus with a 2-year service agreement to inspectors hired to fill positions focused on operations that had been vacant for more than 180 days. As of September 2020, 84 inspectors had accepted this bonus, according to FAA officials.
- In November and December 2018, Aircraft Certification provided a higher leave accrual incentive to two newly hired aerospace engineers, which provided the engineers more leave. Aircraft Certification officials also said that in fiscal year 2020, they provided two additional engineers with this incentive.

In addition to using authorities related to hiring and incentives, FAA and the Office of Aviation Safety have taken other actions to help recruit, hire, and retain inspectors and engineers. For example, FAA has an executive steering committee that meets monthly, according to FAA officials, to identify strategies to increase the number of qualified aviation safety inspector applicants and to meet staffing targets. The steering committee, which according to FAA officials was established in September 2018, consists of members from the Office of Aviation Safety and the Office of Human Resource Management and serves as a forum to collaborate on significant issues, make decisions, and monitor progress to reach inspector staffing targets as well as future workforce goals. For example, one strategy that the executive committee identified to increase the pool of inspector applicants was to establish relationships with technical schools, universities, and other hiring sources supporting inspector career pathways. Flight Standards officials said that they attend recruitment and outreach events at, for example, colleges and universities and professional conferences to share information on inspector qualifications, job duties, and benefits. According to the Office of Aviation Safety, Flight Standards and Aircraft Certification also use performance incentives,

including employee awards and pay-for-performance programs, to help retain inspectors and engineers, as discussed in appendix II.

Conclusions

The success of FAA's aviation safety inspectors and engineers is critically important to ensuring a safe and efficient national airspace system. As more inspectors and engineers in FAA's Office of Aviation Safety retire and the aviation industry implements new technologies, the office must ensure its inspectors and engineers have the competencies necessary to respond to these changes. The Office of Aviation Safety has taken positive steps to identify the critical competencies that its inspector and engineer workforces need to address safety oversight activities. However, without conducting recurring, organization-wide assessments of any gaps that exist in these competencies for the inspector and engineer workforces, the Office of Aviation Safety is limited in its ability to efficiently target workforce strategies such as hiring and training. Identifying organization-wide gaps in critical competencies on a recurring basis and addressing them through hiring, training, or other strategies is important since these actions enable agencies to adapt their workforces to demographic, technological, and other forces that are affecting the agency. In addition, without assessing the extent to which inspectors and engineers possess critical competencies, the Office of Aviation may not be able to effectively leverage the existing skills, knowledge, and abilities of inspectors and engineers to conduct the office's safety oversight mission.

Finally, although the Office of Aviation Safety has taken steps to review training curricula, these steps are one-time efforts and do not involve recurring assessments of inspectors' and engineers' training curricula as a whole. Assessing curricula on a recurring basis can provide more complete information on whether critical competencies necessary for mission success are being sufficiently emphasized in training or if there are any gaps across training curricula. As FAA's use of hiring-related authorities increases the number of inspectors and engineers, it will be important to ensure that the training programs for these employees and others align with critical competencies needed to address agency goals.

Recommendations for Executive Action

We are making the following two recommendations to FAA's Office of Aviation Safety:

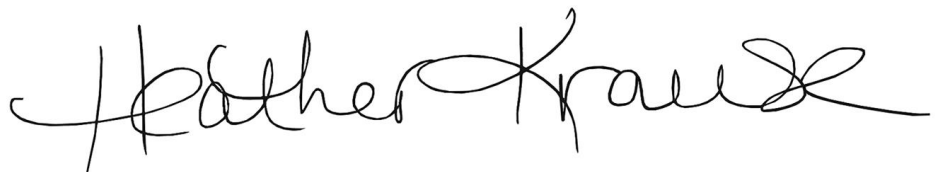
- The Associate Administrator for Aviation Safety should assess organization-wide gaps in identified critical competencies for the Office of Aviation Safety's inspector and engineer workforces on a recurring basis. (Recommendation 1)
- The Associate Administrator for Aviation Safety should assess training curricula for the Office of Aviation Safety's inspector and engineer workforces on a recurring basis to ensure that training courses as a whole align with critical competencies needed to address agency mission and goals. (Recommendation 2)

Agency Comments

We provided a draft of this product to the Department of Transportation (DOT) for comment. In its written comments, reproduced in appendix III, DOT concurred with our recommendations. DOT also provided technical comments that we incorporated, as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Transportation, and other interested parties. In addition, the report is available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or krauseh@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Heather Krause
Director, Physical Infrastructure Issues

Appendix I: Knowledge-Sharing Activities among the Office of Aviation Safety, the Aviation Industry, and FAA Labor Groups on Technological Advancements

The Office of Aviation Safety's Flight Standards Service and Aircraft Certification Service participate in various activities to obtain knowledge from the aviation industry about new technologies. Flight Standards and Aircraft Certification officials said they consult with members of the aviation industry to identify how industry advancements might affect the skills the safety workforce needs. The Office of Aviation Safety also learns about new industry technologies from certification requests, industry forums, and expert panels. As described in table 2, officials stated that knowledge of new technologies shared through these activities can influence the decisions the Flight Standards and Aircraft Certification services make regarding competencies their inspectors and engineers might need. Representatives from three industry associations we interviewed said that industry shares knowledge of new technologies with leaders or policy officials in the Flight Standards Service and Aircraft Certification Service. The representatives said that knowledge of such technologies or other information from the leaders or policy officials (e.g., policies, decisions) do not always transfer down to inspectors and engineers who certify or oversee aviation companies. As previously discussed, Flight Standards and Aircraft Certification officials told us they use their process for identifying and creating new training courses for inspectors and engineers on new technologies when managers identify a skill or knowledge gap that results from the new technologies.

Further, officials from the Office of Aviation Safety told us they regularly meet with Federal Aviation Administration labor groups representing inspectors and engineers, and they sometimes discuss new technologies and their effect on the competencies these workforces need. Obtaining input from the aviation industry and labor groups is consistent with our key principles on effective strategic workforce planning; these principles

**Appendix I: Knowledge-Sharing Activities
among the Office of Aviation Safety, the
Aviation Industry, and FAA Labor Groups on
Technological Advancements**

state that involving employees and other stakeholders in workforce planning can help an agency better understand workforce needs.¹

Table 2: Description of How the Office of Aviation Safety Obtains Knowledge of New Technologies

Type of activity	Description
Review certification requests	<p>Flight Standards and Aircraft Certification officials we interviewed said they learn about new industry technologies and processes when they review certification requests for these technologies and processes. Such information can inform the types of competencies inspectors and engineers might need, according to officials from these services. For example, Aircraft Certification officials told us they have identified systems engineering as a skill the service might need based on discussions with aviation manufacturers and the types of new certification requests they have been seeing. According to Flight Standards officials, managers and workforce planning and development staff discuss the types of competencies inspectors and engineers need to certify the new technologies or processes, and hire or train staff in needed skill areas.</p> <p>As a part of a 2017 restructuring, Aircraft Certification developed the concept of an Innovation Center that aims to engage industry early on its path to certifying new technologies or processes. Officials said this early engagement can help Aircraft Certification identify the skills it will need to hire or train its workforce on before a company submits a request for certification.</p>
Attend meetings with industry	<p>Officials in Flight Standards and Aircraft Certification told us that meetings with industry through forums, committees, and conferences are among the venues for discussing technologies that may affect the skills the workforces need. For example, an official from Aircraft Certification said the service participates in the General Aviation Manufacturers Association’s Electric Propulsion and Innovation Committee, which is a forum for industry to ensure that new technology satisfies the Federal Aviation Administration’s safety requirements. Officials from Flight Standards said discussions with industry through forums, committees, and other venues help them learn about new technologies or processes the aviation industry is using, and that they inform their thinking about the skills inspectors might need to perform their work.</p>
Review results from expert panels	<p>Panels composed of aviation experts are convened to address specific issues related to aviation safety, and can provide the Office of Aviation Safety insight into the types of competencies its workforce needs. For example, expert panels following two crashes of Boeing 737 MAX 8 aircraft recommended that the Office of Aviation Safety needed staff with expertise in human factors, systems engineering, data analytics, and other areas, which the office noted in its most recent workforce plan. This plan notes that the Office of Aviation Safety intends to hire staff with these areas of expertise.</p>

Source: GAO review of documentation from or interviews with the Department of Transportation, the Federal Aviation Administration, and the Office of Aviation Safety. | GAO-21-94.

¹GAO-04-39.

Appendix II: The Office of Aviation Safety Uses Performance Incentives to Reward Inspectors and Engineers Who Meet Organizational Goals

The Office of Aviation Safety has performance incentives that reward inspectors and engineers for their performance, including employee awards and pay-for-performance programs. According to the Office of Aviation Safety, these programs are tied to agency goals and objectives and are used in combination with other benefits, such as retention bonuses and student loan repayments, to help retain inspectors and engineers.

Employee Awards Programs

Both Flight Standards and Aircraft Certification have awards programs to recognize the contributions their inspectors, engineers, and other employees make in support of organizational objectives. According to Flight Standards and Federal Aviation Administration (FAA) guidelines, Flight Standards and Aircraft Certification provide awards to an individual inspector or engineer or a group of inspectors and engineers if they meet certain criteria.¹ For instance, the offices provide awards if inspectors or engineers develop creative or innovative methods that produce more effective and efficient processes, or demonstrate exemplary performance throughout the year that consistently exceeds expectations and contributes to FAA's goals and objectives. Flight Standards and Aircraft Certification's awards programs are governed by FAA policy on recognizing and rewarding employees.

¹Flight Standards developed guidelines for monetary and time-off awards based on FAA's guidelines on the topic. Aircraft Certification uses FAA guidelines for monetary and time-off awards.

Appendix II: The Office of Aviation Safety Uses Performance Incentives to Reward Inspectors and Engineers Who Meet Organizational Goals

Flight Standards and Aircraft Certification make both monetary and non-monetary awards available to employees, according to Flight Standards and FAA guidelines.² Monetary awards can be granted on the basis of measurable or non-measurable contributions.

- Measurable contributions occur when employees' work and impact to the organization can be measured with a specific dollar amount. The award amount for these contributions is based on the dollar value of the benefit to FAA, and can range from 10 percent of the benefit, when the impact of an employee's work results in up to \$10,000 in benefits to the organization, up to an employee's annual salary in cases of much larger benefits, subject to budget limitations and agreement from approving officials.
- Non-measurable contributions occur when employees' work and impact to the organization cannot be measured with a specific dollar amount. In these cases, the award amount can range from \$50 to \$10,000. These awards depend on a manager's assessment of the value of an individual's or group's contribution (i.e., small, moderate, or substantial) and the impact of the contribution (i.e., limited, broad, or general impact).
- Employees may also receive non-monetary awards, which include time-off and honorary awards such as engraved plaques or medals.³ The guidelines state that time-off awards can range from 1 hour to over 40 hours and are also dependent on a manager's assessment of the value of an individual's or group's contribution.⁴ (See table 3).

²Monetary award and time-off award ranges are based on Flight Standards' 2018 guidelines on monetary and time-off awards and FAA's 2019 guidelines on these types of awards. The guidelines provide suggested dollar and time-off awards amounts that offices may provide to employees, subject to budget limitations and agreement from approving officials.

³Honorary awards that the Office of Aviation Safety provides to its employees must be based, according to FAA policy, on an employee's act, service, accomplishment, contribution, or performance that supports, for example, the Office of Aviation Safety's business plan, or FAA strategic priorities.

⁴In addition, inspectors and engineers may also receive other monetary and non-monetary awards. For example, an inspector or engineer may receive an FAA Administrator's Safety Award that provides an employee up to \$2,500 for achievement in making aviation safer and smarter. Executives and other employees covered by FAA's executive system in the Office of Aviation Safety may also receive monetary and non-monetary awards for exceptional achievements and contributions toward the FAA mission.

**Appendix II: The Office of Aviation Safety Uses
Performance Incentives to Reward Inspectors
and Engineers Who Meet Organizational Goals**

The number of awards that Flight Standards and Aircraft Certification provide to employees depends on the value of awards provided to employees throughout the year and on the offices' budgets. On average over the last 5 years, Flight Standards spent \$1,072,600 per year on awards and Aircraft Certification spent \$802,228 per year.

Appendix II: The Office of Aviation Safety Uses Performance Incentives to Reward Inspectors and Engineers Who Meet Organizational Goals

Table 3: Range of Monetary and Time-off Awards That Flight Standards and Aircraft Certification Offices May Provide to Individual or Groups of Inspectors and Engineers

na	Monetary awards			na
Category	Limited impact Impacts the public interest or a specific small work unit in a division or region	Broad impact Impacts the public interest or several regional areas or an entire mode of transportation	General impact Impacts the public interest or more than one mode of transportation or the department	Time-off awards
Small contribution Contributions that help to ease a backlog, promote safety, or complete a special project that benefited primarily the employee's local office or facility	\$50 - \$750 ^a	\$1,501 - \$2,000	\$3,001 - \$4,500	1 - 16 hours
Moderate contribution Contributions that help an entire division, region, or other large geographic area	\$501 - \$1,500 ^a	\$2,001 - \$3,000	\$4,501 - \$7,000	17 - 40 hours
Substantial contribution Contributions that help an entire line of business or staff office resulting in a permanent change in a process or procedure	\$1,501 - \$2,000	\$3,001 - \$4,500	\$7,001 - \$10,000	Over 40 hours ^b

Source: GAO presentation of information from Flight Standards' 2018 guidelines on monetary and time-off awards and the Federal Aviation Administration's (FAA) 2019 guidelines on these types of awards. | GAO-21-94.

Notes: The monetary and time-off awards presented in this table are for monetary awards for inspectors and engineers when their work and impact to the organization cannot be measured with a specific dollar amount. Inspectors and engineers may also receive other monetary and non-monetary awards, not presented in this table. FAA and Flight Standards guidelines state that the monetary award and time-off award ranges are suggested amounts, subject to budget limitations and agreement from approving officials.

^aMonetary ranges differ for Aircraft Certification and Flight Standards. For small contributions with limited impact, Aircraft Certification may provide \$50 to \$500 to individual or groups of employees and Flight Standards may provide \$250 to \$750. For moderate contributions with limited impact, Aircraft Certification may provide \$501 to \$1,500 to individual or groups of employees and Flight Standards may provide \$751 to \$1,500. The information in the table provides minimum and maximum suggested amounts across the two offices.

^bAccording to FAA guidelines, time-off awards cannot exceed 80 hours in a 52-week period.

Pay-for-Performance Programs

Managers, non-bargaining unit inspectors and engineers, and executives in the Office of Aviation Safety participate in agency-wide pay-for-performance programs that provide monetary incentives for meeting individual and organizational goals. Eighteen percent of the Office of Aviation Safety's inspector and engineer workforce is in a pay-for-performance system; none of these employees are in bargaining units. Managers, non-bargaining unit inspectors and engineers, and executives participate in one of the following pay-for-performance programs: (1)

Appendix II: The Office of Aviation Safety Uses Performance Incentives to Reward Inspectors and Engineers Who Meet Organizational Goals

Valuing Performance (VP) program, (2) Management Performance Incentive Program (MPIP), and (3) Executive System Compensation Plan (ESCP). See table 4 for a description of these pay-for-performance programs and their participants. These pay-for-performance programs are agency-wide programs that are established in FAA policies. The Office of Aviation Safety is responsible for implementing these programs for its employees, along with FAA’s Office of Human Resource Management.

Table 4: Federal Aviation Administration’s (FAA) Pay-for-Performance Programs

Pay-for-performance program	Eligible employees	Description
Valuing Performance (VP)	Non-bargaining unit employees; bargaining unit employees, except where applicable bargaining unit agreements contain conflicting provisions or the subject has not been negotiated.	Eligible employees receive an increase in base pay or lump-sum payment based on their performance rating as well as agency performance and other factors that determine the amount of funding available for the program.
Management Performance Incentive Program (MPIP)	Managers	Employees who serve as managers in the VP program and who routinely perform managerial and supervisory duties during the performance year, are eligible to receive a lump-sum monetary incentive to encourage individuals to move into or remain in management positions and to motivate higher levels of sustained performance. The lump-sum incentive payment is based on the manager’s individual performance, agency performance, and the amount of funding available for the program.
Executive System Compensation Plan (ESCP)	Executives and other employees covered by FAA’s executive system	Executives and other eligible employees receive a superior contribution increase and a short-term incentive. The superior contribution increase can include an increase to base pay and a lump-sum incentive based on the performance relative to expectations. The short-term incentive is a lump-sum payment based on their performance ratings.

Source: GAO presentation of FAA information. | GAO-21-94.

Inspectors and engineers in bargaining units represent 82 percent of the Office of Aviation Safety’s inspector and engineer workforce and do not participate in the pay-for-performance programs described in table 4. These bargaining unit inspectors and engineers receive annual wage increases negotiated in their respective collective-bargaining agreements, according to FAA officials. For example, a majority of bargaining unit engineers in Aircraft Certification are a part of the National Air Traffic Controllers Association (NATCA) Multi-Unit bargaining unit and, according to NATCA representatives, receive annual increases equal to annual presidential and federal government raises as well as annual increases of 1.6 percent of their basic pay rate, subject to pay caps.

Appendix III: Comments from the Department of Transportation

**Appendix III: Comments from the Department
of Transportation**



**U.S. Department of
Transportation**
Office of the Secretary
of Transportation

Assistant Secretary
for Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

October 20, 2020

Heather Krause
Director, Physical Infrastructure Issues
U.S. Government Accountability Office (GAO)
441 G Street NW
Washington, DC 20548

Dear Ms. Krause:

The Federal Aviation Administration (FAA) is committed to the hiring and training of critical safety technical positions in the Office of Aviation Safety (AVS). Two specific services within AVS, Flight Standards and Aircraft Certification, are focused on validating and updating the inspector and engineer competencies. The agency is recruiting inspectors and engineers with the required critical occupational skills through the use of hiring initiatives. AVS has implemented a Strategic Initiative on Workforce Development. Several FAA offices are collaborating to identify critical competencies for inspectors and engineers to build new hire curriculum strategies.

Upon review of GAO's draft report, the Department concurs with both recommendations and will provide a detailed response to the recommendations within 180 days of the final report's issuance. We appreciate the opportunity to respond to the GAO's draft report. Please contact Madeline Chulumovich, Audit Relations and Program Improvement, at (202) 366-6512 with any questions or if GAO would like to obtain additional details about these comments.

Sincerely,

A handwritten signature in blue ink that reads "Keith Washington".

Keith Washington
Deputy Assistant Secretary for Administration

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Heather Krause at (202) 512-2834 or krauseh@gao.gov

Staff Acknowledgments

In addition to the contact named above, Heather Halliwell (Assistant Director); Roshni Davé (Analyst-in-Charge); Kevin Barsaloux; Jewel Conrad; Clifton G. Douglas Jr.; Camilo Flores; Dave Hooper; Steven Lozano; Gail Marnik; Josh Ormond; Madhav Panwar; Kelly Rubin; James R. Sweetman Jr.; and Amelia Michelle Weathers made key contributions to this report.

Appendix V: Accessible Data

Agency Comment Letter

Accessible Text for Appendix III Comments from the Department of Transportation

October 20, 2020

Heather Krause

Director, Physical Infrastructure Issues

U.S. Government Accountability Office (GAO)

441 G Street NW

Washington, DC 20548

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Appendix V: Accessible Data

Sincerely,

Keith Washington

Deputy Assistant Secretary for Administration

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James-Christian Blockwood, Managing Director, spel@gao.gov, (202) 512-4707
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Washington, DC 20548



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