December 13, 2021

Mr. Chris Rocheleau
Acting Associate Administrator for Aviation Safety/
 Designated Federal Official, Safety Oversight
 and Certification Advisory Committee
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Mr. Rocheleau,

On December 8, 2021, the Safety Oversight and Certification Advisory Committee (SOCAC) voted unanimously to accept the Workforce Development and Training Recommendation Report.

On behalf of the SOCAC members, please accept the Recommendation Report and submit it to the relevant program offices for consideration and implementation.

Please do not hesitate to contact me with any questions.

Sincerely yours,

/Bill Ayer/

Bill Ayer
SOCAC Chair

Federal Aviation Administration Safety Oversight and Certification Advisory Committee (SOCAC)

Subcommittee Report on the Workforce Development and Training (WDAT) Task

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Executive Summary

The Federal Aviation Administration (FAA) and industry must develop an aviation safety workforce that can accommodate and respond to modern oversight methodologies and technology. The FAA tasked the Safety Oversight and Certification Advisory Committee (SOCAC) with providing recommendations on preparing the FAA and the industry for future personnel knowledge and skill needs. The FAA asked the SOCAC to help in two areas related to workforce development:

- Provide advice and recommendations on ways to develop, supplement, and train an agile aviation safety workforce; and,

- Identify ways that industry can work with the FAA to cooperatively develop and use the training.

The SOCAC accepted and delegated the Workforce Development and Training (WDAT) task to the Subcommittee consisting of SOCAC members who were vetted and appointed by the Secretary.

To aid that goal, the SOCAC Subcommittee Working Group examined strategies and methods for attaining knowledge and critical thinking skills to support current and future aviation safety duties. After a thorough review of minimum skills and knowledge, available content, delivery methods, and modern assessments, the Working Group identified a four-tiered approach to imparting information in the three areas of information that support a vital, knowledgeable workforce in the aviation safety environment:

1. Regulatory compliance
2. Technology
3. Professional development

The knowledge expectations and levels would apply to agency or industry employees involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance, i.e., working with or for the Aviation Safety (AVS) organization. Each level of training would be developed to build upon the knowledge and skills of the prior level.

- Level 1 – Basic Knowledge Courses for all agency or industry employees working with or for the Aviation Safety (AVS) organization or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Level 2 – Intermediate Knowledge Courses for AVS or industry employees involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Level 3 – Advanced Knowledge Courses for any AVS, or industry employee involved in or responsible for or directly engaged in regulatory compliance, drafting policy, procedures, guidance, or letters to show or find compliance with 14 or 49 CFR.

- Level 4 – Specific In-Depth Knowledge Courses for any AVS, or industry employee involved in or responsible for or directly engaged in regulatory compliance, drafting policy, procedures,

guidance, or letters to show or find compliance with 14 or 49 CFR or performing compliance or compliance determination tasks.

Appendices A to C provide examples of the training experiences and knowledge expectations for each level.

Using the proposed model, which is based upon a thorough review of basic educational systems, available training from general educational institutions, and those focused on aviation safety education, the SOCAC recommends that the FAA:

1. Formulate knowledge requirements for FAA employee roles consistent with the format of the Appendices.

2. Rely on outside parties (ranging from other federal agencies to knowledgeable individuals) to provide subject matter expertise on an immediate basis and in training.

3. Encourage the mutual and collaborative development of educational opportunities by:

   a. Simplifying the IA training course approval process.

   b. Encouraging industry to make more courses available to both industry and FAA participants (increasing educational opportunities and providing better instruction on emerging technologies).

   c. Establishing methodologies and metrics for objectively judging whether third-party training is acceptable and effective.

   d. Establishing policies that permit the FAA to collaborate with the private sector in developing training.

The work from this task can be utilized to assist industry and FAA in hiring, training, and leveraging a workforce that must perform in a dynamic environment. The recommendations may be used to develop workforce knowledge standards to promote the career development and the critical thinking essential for adapting to legislative, regulatory, and technological advancements.

Task

The FAA task contained two significant items:

- Develop standards for knowledge and skills of stakeholder personnel responsible for the application, certification, continued compliance, and oversight of design, production, operation and maintenance approvals and certificates.

- Issue a report containing a detailed description of the Subcommittee's review and analysis of the assigned tasks and standards along with recommendations, which is due to the SOCAC by October 4, 2021, for its review and recommendations to the FAA.

The details of the task SOCAC assigned to the Subcommittee on Workforce Development and Training and the associated recommendations or report language include:

1.   In support of FAA Learning Strategy development, make recommendations on standards for knowledge and skills of stakeholder personnel responsible for the application, certification, continued compliance and oversight of design, production, operation and maintenance approvals and certificates. (*See*, Task 1. and 1.c.)

(Learning Standards and Skills Identification)

a. Review the regulations, advisory and guidance material to identify any current standards for knowledge, experience and/or training for stakeholder personnel involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance. Submit the results of this review with the knowledge and skill providing the highest value for design, production, operation, and maintenance focus areas. (*See*, Subcommittee Meetings and Discussions.)

b. When conducting the review in item 1a, identify standards that are applicable to all stakeholders responsible for making applications, certificating, continued compliance and oversight of certificates and approvals, particularly delegated activities in design, production, operations, and maintenance, and provide recommendations for common criteria or standards. (*See*, Subcommittee Meetings and Discussions.)

(Staff Skillset Recommendations)

c. Using the review conducted in item 1a, provide recommendations on personnel knowledge and skill to sustain both traditional and evolving regulatory roles and responsibilities. For those identified as evolving or non-traditional, provide recommendations on roles and responsibilities. (*See*, Task 1. and 1.c.)

d. Provide recommendations, including barriers and potential solutions under which the FAA may quickly supplement its staff with subject matter expert assistance on an as needed basis. (*See*, Task 1.d.)

(Learning Opportunities)

e. Identify opportunities for the FAA, industry, and other aviation stakeholders to develop and exchange knowledge. Identify barriers that may restrict learning experiences and recommend methods by which those barriers can be overcome. The goal is to provide training and experience to agency, industry, and other aviation stakeholder personnel to meet current and emerging needs. (*See*, Task 1.e. and 1.f.)

f. Propose methods for mutually and collaboratively developing and providing educational experiences that can be found acceptable for compliance with 14 CFR requirements and for encouraging continued education for stakeholders responsible for making applications, certificating, continued compliance and oversight of certificates and approvals or delegating in design, production, operations, and maintenance activities in—

      i.   Regulatory compliance,

      ii. Technical knowledge, and

      iii. Professionalism.

In completing this task, SOCAC should explore the creation of partnerships with universities and other external educational organizations. (*See*, Task 1.e. and 1.f..)

SOCAC should make recommendations related to performance measures that provide a means to evaluate the effectiveness of these learning opportunities on the knowledge and skills required to meet the recommended standards.

2. Develop a report containing recommendations on the findings and results of the tasks explained above.

   a.   The recommendation report should document both majority and dissenting positions on the findings and the rationale for each position.

   b.   Any disagreements should be documented, including the rationale for each position and the reasons for the disagreement.

Subcommittee Meetings and Discussions

During the Subcommittee's first meeting[1] the FAA's Office of Rulemaking (ARM) provided a presentation on the Federal Advisory Committee Act (FACA) requirements, roles, and expectations of the Subcommittee. To ensure consensus could be achieved, the Subcommittee reviewed each element of the assigned task and actions to ensure its work focused on the core requirements. Members discussed the issues that their segment of the industry have with the FAA's certification and safety oversight process particularly in the compliance assessment arena. It was generally agreed that the lack of basic and standardized regulatory, technical, and professional expectations and training resulted in agency personnel abandoning their role as compliance oversight officers.

The Deputy Director, Office of Safety Standards, Flight Standards Division and the Deputy Director for Strategic Initiatives, Aircraft Certification Service, provided management perspective of the task and expected outcomes. The FAA agreed defining the role of the regulator, applicant/certificate holder in a knowledge-based accountability framework would enhance the agency's role in compliance findings and oversight.

The Subcommittee discussed the challenges the agency and industry face, including—

- Significant turnover in managerial, technical, and administrative personnel. Loss of knowledge and experience introduces risk to the National Aerospace System (NAS) unless transferred and replaced in a timely, efficient, and continuous manner. The simultaneous increase in non-traditional aviation entrants and innovative technologies and systems exacerbate workforce deficiencies in knowledge. The aviation safety agencies and industries must manage workforce knowledge requirements to maintain a risk-based certification and safety oversight system in a fast-paced legislative, regulatory, and technical landscape.

- Competition for the same talent. The FAA and the industry both obtain candidates from the same pool of talent. Additional pressure comes from other industries drawing on talent fostered by or required in aviation with its need of diversity and career pathways and opportunities. Fostering standards for knowledge, training, and skills, assessing, and addressing gaps ensures advancement for all stakeholders. The FAA and industry can implement new knowledge exchange tactics to accomplish planned strategies and goals.

To begin its work, accomplish task assignment 1.a., and identify similarities knowledge requirements, the Subcommittee developed a matrix to identify the current standards and universal skills required for both workforces. The matrix also gathered information on constituency and regulator knowledge, and the impediments to agency personnel performing a compliance role. The methodology of review would enable an analysis of the plain language of the regulations and

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[1] November 4, 2020.

identification of standards by which to train. After defining the matrix format, covered subjects and definitions, specific regulatory parts were chosen for review.

A review of the input to accomplish task assignment 1.b., quickly made apparent that the knowledge and skills applicants must show to obtain an individual pilot, dispatcher, air traffic controller, mechanic, or other personal certificate were discernible. Curricula, training objectives, knowledge expectations, and assessment requirements have been defined and are provided by multiple sources. On the other hand, the knowledge and skill requirements for many key positions that ensure efficient and effective application, review, certification, and oversight functions were missing.

The Subcommittee reached early consensus that to address task assignment 1.c. through 1.f., basic training levels must be developed to give personnel the required tools to perform current and future roles while ensuring diversity and providing career advancement opportunities. Consensus was reached that to continue reviewing and analyzing individual regulatory parts was unnecessary. Rather, outlining basic requirements for knowledge for various levels of responsibility in design, production, and maintenance aligned with both agency and industry personnel requirements would enable the Subcommittee to achieve its multi-faceted task in a timely manner. The Subcommittee used the regulatory gathering tool to outline the types of information persons in various positions within the different organizations needed to accomplish task assignment 1.b.

The Subcommittee assigned a Working Group the task of developing outlines to depict the appropriate levels of training, from basic knowledge requirements to the information required by management personnel and subject matter experts in the areas of regulation, technology, and professional development.

The Subcommittee received briefings from the Working Group at each subsequent meeting. The Subcommittee consensus made clear that the first knowledge tool for both the agency and the industry was a fundamental understanding of how regulations are developed, how they intersect and impact others, who/what the regulations govern, and the *different* roles government and industry must play. Members agreed that personnel cannot be trained to a regulation unless there is a thorough comprehension of the process and where the individual fits into the process.

The FAA shared input on its current basic training for new employees and agreed that more is needed to ensure continued competence and career growth. To achieve its strategic plans and develop its safety critical workforce, an integrated approach with multiple sources for on-the-job training, formal and informal courses, professional development, career path and retention is being developed.

The Subcommittee discussed barriers to mutual training opportunities among and between the industry and the agency. The consensus was that there is a nebulous understanding of when training would need to be provided on a compensatory basis and when mutual training could be recognized by the agency and the industry. The Subcommittee was clear, however, that the FAA can encourage industry participation in training by openly promoting applicant and certificate holder participation in any publicly available session.

For example, clearly delineating the Oklahoma City sessions that are open to the public and letting trade association, applicants, and certificate holders know the availability and schedule through the email addresses on file is desirable. Conversely, encouraging the agency's aviation workforce to audit or monitor courses provided by applicants or certificate holders that are found acceptable

to or are approved by the agency, such as inspection authorization (IA) renewal courses, would provide its workforce immediate knowledge opportunities.

The Working Group drafted and reviewed (although the Subcommittee did not finalize) a document outlining the types of training the AVS organization could find "acceptable" for various purposes (*SUBJ: Course and Provider Acceptability For 14 And 49 CFR Training*). During subsequent meetings and discussions, the SOCAC became aware of the agency's review of its inspection authorization course acceptance procedures. A letter[2] to current providers of acceptable IA refresher training was issued allowing courses to be updated based upon defined criteria without further review and acceptance by the FAA. The agency also released a draft Advisory Circular for IA refresher course training acceptance and posted it for public comment at the end of September 2021. The SOCAC members are encouraged to provide comments to ensure the result sought by the Working Group, that was reviewed, is realized. The Working Group Memorandum is attached as Appendix E – Working Group Memorandum on IA Refresher Training.

Working Group Report

The SOCAC Subcommittee selected the following working group members:

- Sarah MacLeod

- Shelly Dezevallos

- Greg Shoemaker (Scott Fohrman as subject matter expert)

- Mike Perrone (Daniel Porter and Jean Hardy as subject matter experts); Ben Struck took over upon Mr. Perrone's retirement

- Jason Dickstein (as able)

- Tim Obitts (Keith Deberry as subject matter expert)

The Working Group was provided with the list of persons offering themselves as subject matter experts as the result of SOCAC Advisory Committee Task Notice of October 5, 2020. In particular, the Subcommittee members requested that the Working Group seek advice and information from their nominated subject matter experts.

Transforming workforces to accommodate the legislative, economic, technological, and regulatory changes is a management challenge facing all federal agencies and regulated parties. Using the knowledge, recommendations, and data from myriad government audits and reports[3] of the FAA, the agency can standardize its workforce knowledge assessment and provide training based upon current government job descriptions and expectations. Much of the knowledge required for aviation safety inspectors, engineers, and analysts are the same for industry positions with similar requirements or responsibilities. Where the qualifications of the regulator and its regulated parties are equivalent, mutually available training opportunities will advance the recruitment, retention, efficiency, nimbleness, and adaptation of both workforces to new requirements and technologies.

Although the FAA and aviation industry are experiencing turnover while innovation and technological advances continue unabated—a trend expected to continue—the ability to keep abreast of the knowledge transfer through mutually available training opportunities abound. The

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[2] *See*, Appendix E -- FAA LETTER TO PROVIDERS OF IA REFRESHER TRAINING.

[3] *See*, Appendix D – Government Audit and Report Review.

agency and industry are facing the unenviable task of transforming workforces while ensuring transfer and replacement of current knowledge and experience and simultaneously developing new competencies. By providing mutual training opportunities that meet standard knowledge transfer elements, the departing workforce will be encouraged to transfer information to the existing and future workforce.

The FAA and industry workforces must be equipped to work within and oversee a constantly shifting national airspace system. As new entrants and changing legislative driven priorities continue and increase, the FAA must ensure critical knowledge and skills are readily available to and for its workforce and are available from and within the educational system and industry. By developing mutually acceptable knowledge expectations, assessment criteria, training opportunities, and knowledge transfer assessments, the FAA and industry can mutually invest resources to overcome current and future regulatory and technical realities.

Today's FAA workforce management plans include efforts on hiring diverse personnel to bring different backgrounds and experience to fill skill gaps. Success cannot be claimed when a new person is hired—rather, success is dependent on the quality of training, career development and the measurable reduction in time through removing duplicative or unnecessary efforts. The FAA, in collaboration with educational institutions and industry, can develop knowledge requirements that provide a variety of information sources that may need to be imparted to an aviation-centric workforce.

There are well-defined standards for the design, production, operation and maintenance of articles and products, but there are no discernable standards for knowledge, skills, and abilities of people outside those controlled directly by the regulations (*i.e.*, pilots, mechanics, dispatchers, air traffic). The deployment of a structured "levelized" training program would ensure that all employees are provided the same understanding of how the federal system of government works, including how its employing agency fits in and operates, before breaking off into specialized training areas.

Many audits have reported challenges that FAA faces with adapting its workforce in response to increased and expanded oversight activities. The challenges reflect a lack of standardized training required for all employees responsible for certification and oversight of the areas being contemplated by the task. The "next generation" workforce has not been provided knowledge on the basic functions of government,[4] the three branches of the federal government, and the different statutes and regulations governing many industries. It is imperative the gap be filled for persons that will be responsible for the NAS.

Once an employee learns the national and international aviation legal and regulatory framework, the ability to adapt to changing technologies will become more readily evident. Applying the same logic to technology and professionalism merely ensures the agency and the industry can provide mutually acceptable educational opportunities with a variety of courses on any specific subject area. Foundational competencies in these areas can be carried into the next level career progression and new oversight activities.

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[4] "Until the 1960s, it was common for American high school students to have three separate courses in civics and government. But civics offerings were slashed as the curriculum narrowed over the ensuing decades, and lost further ground to "core subjects" under the NCLB-era standardized testing regime." *Forgotten Purpose: Civics Education in Public Schools*, neaToday, March 16, 2017

To fulfill the tasks associated with workforce development the Working Group reviewed information and data on systems to provide a discernible path for individuals to attain the knowledge that ensures critical thinking can be applied to the standards established by civil aviation safety agencies. Since critical thinking is the ability to mentally process information in a clear, logical, reasoned, and reflective manner within the NAS, it includes the ability to describe, explain, and interpret safety standards vis-à-vis showing or finding compliance. The Working Group researched and reviewed training models, compared the models, and evaluated them for alignment with established training and methodologies to identify areas where new training would be needed.

The Working Group offers the following aid to visually illustrate the levels of knowledge associated with successful development critical thinking capabilities and skills. The levels outlined for Regulatory and Technical Knowledge and Professional Development are based on the concepts used by educational institutions, standard setting organizations, trade associations, and other parties that provide training for success in the international aviation safety system. If the agency establishes similar concepts in the information its workforce needs, the FAA can take advantage of providing and receiving acceptable regulatory, technical, and professional instruction from and to multiple sources.

Depth of Knowledge (DOK) Levels
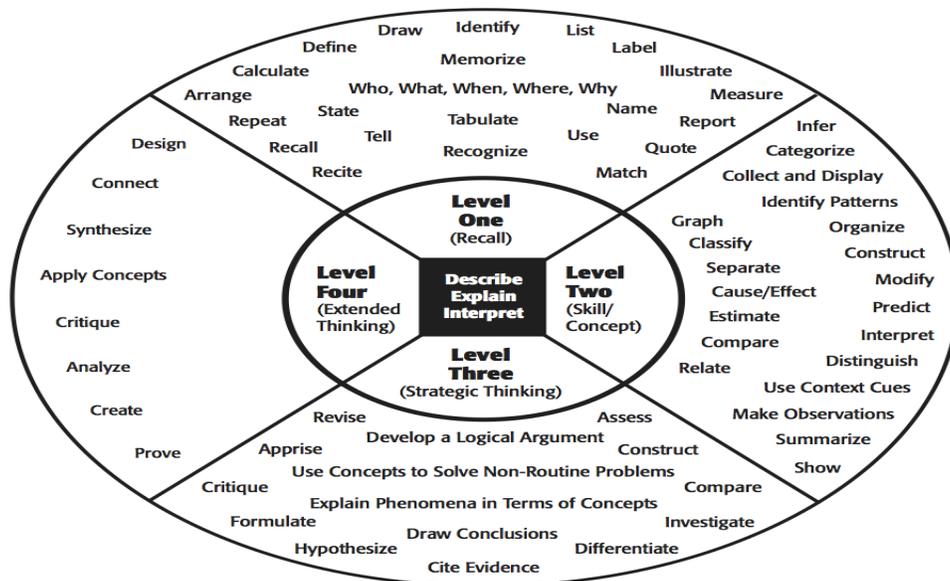
Level One Activities	Level Two Activities	Level Three Activities	Level Four Activities
Recall elements and details of story structure, such as sequence of events, character, plot and setting.	Identify and summarize the major events in a narrative.	Support ideas with details and examples.	Conduct a project that requires specifying a problem, designing and conducting an experiment, analyzing its data, and reporting results/ solutions.
Conduct basic mathematical calculations.	Use context cues to identify the meaning of unfamiliar words.	Use voice appropriate to the purpose and audience.	Apply mathematical model to illuminate a problem or situation.
Label locations on a map.	Solve routine multiple-step problems.	Identify research questions and design investigations for a scientific problem.	Analyze and synthesize information from multiple sources.
Represent in words or diagrams a scientific concept or relationship.	Describe the cause/effect of a particular event.	Develop a scientific model for a complex situation.	Describe and illustrate how common themes are found across texts from different cultures.
Perform routine procedures like measuring length or using punctuation marks correctly.	Identify patterns in events or behavior.	Determine the author's purpose and describe how it affects the interpretation of a reading selection.	Design a mathematical model to inform and solve a practical or abstract situation.
Describe the features of a place or people.	Formulate a routine problem given data and conditions.	Apply a concept in other contexts.	
	Organize, represent and interpret data.		

Webb, Norman L. and others. "Web Alignment Tool" 24 July 2005. Wisconsin Center of Educational Research. University of Wisconsin-Madison. 2 Feb. 2006. http://www.wcer.wisc.edu/WAT/index.aspx. Webb's depth of knowledge guide. (2009). Retrieved from http://www.aps.edu/re/documents/resources/Webbs_DOK_Guide.pdf.

Learning Methods

In evaluating the optimal methods for imparting and receiving information for each level of knowledge within regulatory, technology and professional development, or any other subject, the Working Group reviewed the general methods by which information is absorbed by the student along with the generally recognized methods of delivery.

Educational institutions and experts generally agree that information is absorbed in four ways:

- Visual—Watch It

    o Utilize graphic organizers such as charts, graphs, and diagrams
    o Redraw pages from memory
    o Replace important words with symbols or initials
    o Highlight important key terms in corresponding colors

- Aural—Hear It

    o Record summarized notes and listen to them on tape
    o Talk it out; role play; discussion groups
    o Reread notes and/or assignments aloud
    o Explain notes to peers/fellow aural learners

- Read/Write

    o Write, review, and rewrite words and notes
    o Reword main ideas and principles to gain a richer understanding
    o Organize diagrams, charts, and graphics organizers into statements

- Kinesthetic—Do It

    o Use real examples - applications and case studies
    o Redo lab experiments or projects
    o Utilize pictures and photographs to illustrate ideas

All methods are used at various times in formal and informal processes. The important objective of understanding the methods is to take advantage of each type to create an environment that encourages continual knowledge absorption to enhance career development. It is also important to understand how each method interacts with the other to encourage a diversity of individuals in any session or class imparting information or knowledge, which ensures those with actual experience may help those that may have only read about an activity. Finally, understanding the methods allows different types to be used to ensure retention by individuals with various skill and experience levels.

Retention of Information

To aid in evaluating the expected outcome for each level of knowledge imparted, the Working Group looked at the retention associated with each general methodology represented by the following illustration.

The Cone of Learning
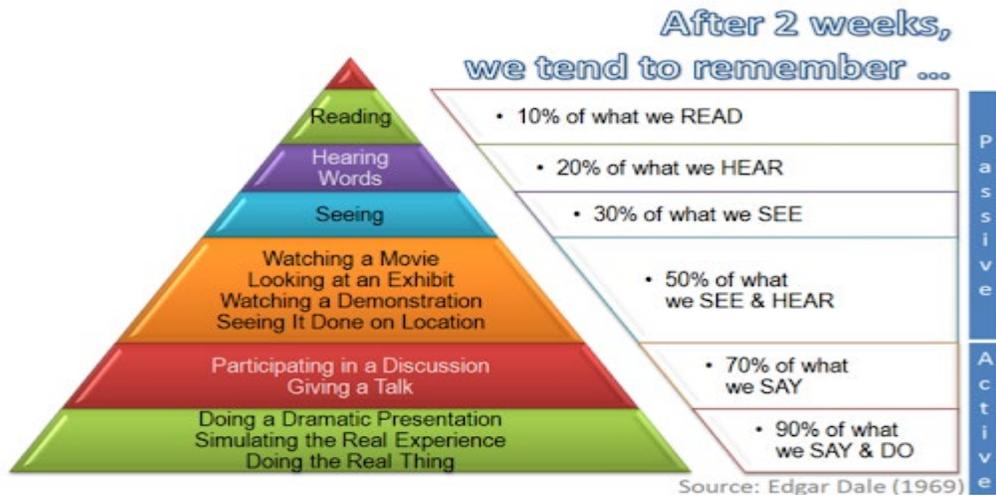
Source: Adapted from E. Dale, Audiovisual Methods in Teaching, 1969, NY: Dryden Press.

The knowledge needed by industry to comply with aviation safety regulations and the critical thinking needed for the agency to be effective and efficient in its use of different learning methods for delivering the knowledge tools at each level can be optimized. It is recognized that a combination of all training methods is needed to ensure knowledge is imparted, to ensure diversity and career advancement.

By looking at the pros and cons versus the expected outcome, the following evaluation is provided:

Retention Method	Pro	Con	Optimum use by level
See it	Readily available	Provides no experience	1-2
Hear it	Readily available	Provides no experience	1-2
Write it	Readily available	Provides no experience	1-2
Do it	Provides experience	Industry/position specific Not as readily available	3-4

Delivery Methods

To understand and provide a basis for accepting different providers and methods of imparting information at each level of knowledge, the Working Group found that generally, the delivery methods were broken into four categories:

- Teacher centered
- Student centered
- Content-focused
- Interactive/participative

Within each delivery category there are high- and low-tech methods, all of which should be acceptable for imparting information; some include the ability to assess the skills or knowledge obtained. Examples include:

- Technology-based learning, i.e., use of technology to deliver the knowledge or test the skill—simulators, films, videos, computer-based-instruction, tutorials, etc.

  o With live and direct instructor interaction
  o With ability to ask questions later
  o With no interaction (live or otherwise) with the instructor

- Case studies—imparting a fact pattern and asking the student to apply the pertinent facts to the standard (e.g., the regulation or industry standard/requirement) where the focus needs to be on the path taken to achieve the result rather than the result (almost all case studies will have more than one "good or right" outcome).

- On-the-job training—hands-on based upon other training or knowledge being imparted; the result should be the ability to complete the task or demonstrate the skill without external instructions, coaching or mentoring.

- Coaching—one-to-one exchanges to enhance an individual's skills, knowledge, or work performance.

- Mentoring—providing perspective on the individual's skills, knowledge, or work performance to enhance regulatory, technical, or professional development.

- Lectures—provided by knowledgeable instructors.

- Group discussions—provides diversity of thought and experience.

- Role playing or debate—a method of imparting information and testing knowledge, making a case for the other side of an issue.

- Management games—also a method of imparting information and testing knowledge, what are the objective criteria associated with the game?

- Reading and writing—absorbing information and imparting that information to another in one's own words.

Assessment Techniques

The Subcommittee members directed the Working Group to ensure that assessment methodologies and results could not be punitive. The Working Group found that appraisals must gather information on types, urgency, availability of training needs and the efficiency and effectiveness of the training provided to continually enhance the individual, the training, the instructor, method, and thus the workforce.

Assessment of participant knowledge before and during the learning experience, along with an evaluation of information imparted and gained, is consistent with expectations of the aviation safety regulations for individuals to which the FAA issues certificates. For example, a pilot must pass "ground" and "flight" tests, successful applicants learn from all four Learning Methods; however, as levels of responsibility increase, different methods of delivery must be used to attain optimum capability to demonstrate compliance (see, The Cone of Learning graphic).

Assessing knowledge and skills before, during, and after an educational exercise ensures the instruction is timely, appropriate, and efficiently administered. Factors that may interfere with the need or ability to assess a participant's knowledge or skill level may include mandatory requirements, economic hurdles, and other necessities. These may be overcome by ensuring there is more than one way for the information to be obtained, absorbed, and demonstrated. Assessments must be designed to elicit process improvements in the chosen educational provider, method, and system; the individual to whom information is provided is only one element of an educational appraisal.

In all events, assessments must be created by trained and experienced developers to ensure the methods—

✓ Align with the results expected from the learning experience.

✓ Provide substantive feedback on the material and method to both the provider and the participants.

✓ Ensure the depth and breadth of participants are fully utilized during and after the experience.

✓ Provide appropriate feedback on information missed by the provider and the participant.

This will ensure that the optimum results are achieved without the threat or fear of disciplinary action or job jeopardy based on assessment results.

Therefore, the Subcommittee and the Working Group believe it is essential that there is open collaboration during the development and implementation of any assessment protocol with the certified bargaining representatives of every affected employee group within the FAA, as well as with formal and informal organizations or individuals who represent employees within private industry.

Levelized Training Outlines and Usage

At the Subcommittee's direction and consensus, the Working Group developed general outlines for knowledge tools and objectives for level 1 to 4 in the areas of regulation, technology, and professional development. While the information imparted may not be required for all agency or industry employees, the availability of the information is essential for training, diversity, and career development.

The ability to assess the knowledge of individuals ensures an efficient and effective application of training methodologies. An understanding of the individual's knowledge allows the interactive learning methods to be used most effectively. The levels outlined are not definitive; rather they are offered as a standard method for assessing the knowledge required to apply critical thinking to different responsibilities, authorities, duties, and tasks. The ability to quickly identify and fill knowledge gaps is essential to identifying subject matter expertise or further training.

These outlines are commensurate with several standard setting organizations' efforts in the field of civil aviation engineering for the industry.[5]

Analysis

Previous reports[6] outlining the FAA's workforce development analyzed aspects such as planning documentation, data analytics and project management; the agency's assessment of its workforce needs; steps it has taken to identify critical future skills; identification of gaps in necessary skills; and methods the agency uses to evaluate its performance against defined goals and strategic initiatives. Much of the reports offer process-oriented recommendations to the FAA on its planning, implementation, and evaluation processes to ensure that training and development investments are directed strategically. This Working Group Report focused on implementation of training that can be applied to the current and future agency and industry workforce that enables swift adjustments to specific areas once the basic elements of knowledge are ascertained and assessed.

Congress has directed the FAA to focus on development of its workforce to ensure, among other reasons, the United States remains the global leader in aviation. The FAA's ability to attract and retain employees with the right knowledge, skills, and abilities to maintain global leadership cannot be assured without a standard method of developing and implement training that will educate the industry and the agency's personnel. While the methods of learning will vary depending upon the current workforce's knowledge, the learning objective is to ensure basic knowledge is imparted.

This Working Group Report explores those key learning and delivery methods and offers a sample levelized outline for structured training in the areas of regulatory compliance knowledge, technical knowledge, and professional development.

Conclusion

To enable the development of a workforce capable of critical thinking in the application of aging regulations to modern technology while retaining the ability to understand and apply the same regulations to traditional aeronautical design, basic knowledge must be imparted, and the individual needs assessed to ensure the information will be used within the assigned duties, responsibilities, and authority of employment.

The most efficient and effective method of achieving this result is to ensure both the agency and industry can impart similar information and training since both compete for the same workforce talent. A method of achieving a result that is adaptable to the educational institutions focused on aerospace is to standardize the knowledge (expectations) and to apply the proper assessment to ensure training is provided in a logical, effective, and efficient manner. As government and industry expectations and knowledge requirements change, the standards can be adjusted as well as the actual knowledge provided. To ensure continuous improvement, a regularized review and

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[5] *See*, National Aerospace Standards (NAS) NAS-9945 *Airworthiness Engineering Training and Education Standard Practice* (published July 8, 2020), NAS is working on NAS-9945-1 *Airworthiness Engineering Academic Curricula Standard*, NAS-9945-2 *Airworthiness Engineering Education – Civil Aviation Standard*, NAS9945-3 *Airworthiness Engineering Education – Military/Defense Standard* and is considering NAS-9945-4 *Airworthiness Engineering Education – Emerging Technologies*. American Society for Testing and Materials (ASTM) F-3457-20 *Standard Guide for Aircraft Certification Education Standards for Engineers and Professionals in Aerospace Industry*.
[6] *See*, Appendix D – Government Audit and Report Review.

update of the approaches and processes for workforce development and advancement must be made.

Recommendations

The Subcommittee requests that the SOCAC consider making the following recommendations.

Task 1. and 1.c.

1. In support of FAA Learning Strategy development, make recommendations on standards for knowledge and skills of stakeholder personnel responsible for the application, certification, continued compliance and oversight of design, production, operation and maintenance approvals and certificates.

<p align="center">* * *</p>

1.c. Using the review conducted in item 1a, provide recommendations on personnel knowledge and skill to sustain both traditional and evolving regulatory roles and responsibilities. For those identified as evolving or non-traditional, provide recommendations on roles and responsibilities.

Recommendation

The agency may use the Outline of Levelized Training provided in APPENDIX A -- Training Outline—Regulatory Compliance Knowledge, APPENDIX B – Training Outline—Technical Knowledge, and APPENDIX C – Training Outline—Professional Development to formulate its standards for knowledge in the fields commensurate with its job descriptions. The agency should collaborate with standard-setting organizations and educational institutions to ensure the basic levels of knowledge are imparted and can be assessed.

Task 1.d.

Provide recommendations, including barriers and potential solutions under which the FAA may quickly supplement its staff with subject matter expert assistance on an as needed basis.

Recommendation

The agency should use other federal agencies with similar responsibilities for safety and with equivalent or best technology requirements as subject matter experts in regulatory and technical fields. In addition, the agency has designees, national and international educational institutions, research organizations, and other avenues to obtain subject matter experts and expertise.

Task 1.e. and 1.f.

1.e. Identify opportunities for the FAA, industry, and other aviation stakeholders to develop and exchange knowledge. Identify barriers that may restrict learning experiences and recommend methods by which those barriers can be overcome. The goal is to provide training and experience to agency, industry, and other aviation stakeholder personnel to meet current and emerging needs.

1.f. Propose methods for mutually and collaboratively developing and providing educational experiences that can be found acceptable for compliance with 14 CFR requirements and for encouraging continued education for stakeholders responsible for making applications, certificating, continued compliance and oversight of certificates and approvals or delegating in design, production, operations, and maintenance activities in—

- *Regulatory compliance,*

- *Technical knowledge, and*

- *Professionalism.*

Recommendation 1

The FAA can accomplish several relatively benign processes that will encourage the mutual and collaborative development of educational opportunities—

In February 2020, the FAA announced it was developing new IA Refresher Course Provider guidance and application instructions. During the resulting pause, agency personnel have requested industry input regarding program burdens. Based on that feedback and mandates to improve aviation training availability, the government should use this opportunity to simplify its policies for course acceptability to conform with § 65.93(a)(4), reduce complexity of its own oversight, and increase flexibility for training providers to adapt to changing needs. Improving existing agency policy will require—

- Simplifying Order 8900.1, Vol. 3, Ch. 56 to remove individual course application requirements and explain how to manage existing courses until such expire.

- Updating the Inspection Authorization Information Guide (FAA-G-8082-19) to instruct IA holders in demonstrating when completed training is appropriate for renewal of the authority.

- Reorganizing information presented on faasafety.gov, including IA renewal information available through the "Maintenance Hangar" and in the online library.

Any FAA representative should be allowed to audit an IA renewal training course; additionally, agency divisions and offices, industry trade associations, certificate applicants and holders should be encouraged to create IA-renewal courses to enhance regulatory and technical knowledge. New entrants should be encouraged to obtain information from current courses and be requested to create courses on new and emerging technologies or use of existing technologies in the aerospace industry.

Recommendation 2

Aviation Safety should issue an AVS-wide policy that encourages creation and participation in regulatory, technical, and professional advancement courses provided by trade associations, educational institutions, and corporate applicants and certificate holders. The policy could also set the minimum standard for developing learning experiences acceptable to the agency for credit in regulatory and technical training required for designees, mechanics, repair stations, manufacturers, and operators.

The policy could create the minimum criteria needed to determine when training provided by external sources was acceptable for industry and agency personnel. It would establish the basis for developing mutually acceptable learning experiences, provide the ability for the agency and the industry to collaborate without fear of reprisal or running afoul of ethical and legal obligations by either party.

APPENDIX A -- Training Outline—Regulatory Compliance Knowledge

Level 1 – Basic Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Knowledge tools provided

  o Administrative agencies, powers, and the interrelationship among federal government agencies
  o Why and how the FAA was created and how it is changed—the statutes past and present
  o Organizational structure of DOT and FAA

    ▪ External (DOT) and internal (FAA) structure
    ▪ Relationship with other agencies (NTSB, EPA, OSHA, TSA, etc.)
    ▪ Relationship with the public

- Formal rulemaking committees under FACA or ARC

  o Past activities
  o Current activities
  o Finding recommendations

- Informal working relationships with labor, trade associations, standard-setting bodies, and public interest groups

  o FAA regulatory process/creating regulations

    ▪ Legislative/statutory mandates
    ▪ Executive orders
    ▪ Developing new or amending existing regulations
    ▪ Overview of FAA/14 CFR parts
    ▪ Overview of guidance material – determining when and how to develop

      ✓ Directly related to a regulation
      ✓ Indirectly related—acceptance of or guidance for "best practices", additional items of safety, e.g., AC 25-32

Learning objectives/knowledge assessed

- Where to find statutes and regulations—past and current

- What the FAA regulates/controls

- How and why the FAA develops new or updates existing regulations, guidance and encourages best practices

- The "persons" subject to regulatory compliance requirements

- Internal FAA lines of business, what each does and how they interact

- Employees' role(s) within the organization

Level 2 – Intermediate Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Knowledge tools provided

  - Understanding related regulatory materials and applications—preambles, guidance, orders, legal interpretations, etc.
  - Master plain language, meaning, and safety intent of pertinent regulations through history and evolution of safety and technological requirements
  - Introduction to international aviation safety

    - The International Civil Aviation Organization (ICAO)
    - The agency's involvement in ICAO and its impact on the agency's policies and procedures
    - The bilateral aviation safety agreement process
    - Introduction to the agency's oversight system

      - ✓ Its evolution from conception to SMS
      - ✓ Its current methodology (generally)

  - Deeper instruction on regulations generally by CFR parts

    - Identifying regulations related to scope of work/role
    - Application of regulations related to scope of work/role

      - ✓ Interface with other parts/regulations—particularly among and between those impacting design, production, operations, and maintenance activities—decisions in design directly and indirectly impact production, operation, and maintenance of the entire product and every piece part—strong emphasis on the regulatory connections that have existed since the government began setting standards.
      - ✓ Regulatory conflicts

- Learning objectives/knowledge assessed

  - Finding specific regulations
  - Basic application of the different parts to the different "persons" to which the regulation applies and its interface with other certificate holders or FAA lines of business

Level 3 – Advanced Knowledge

Course required for any agency or industry employee directly involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance, e.g., drafting policy, procedures, guidance, or letters to showing or finding compliance with 14 CFR.

- Knowledge tools provided

  - Understanding compliance

    - Compliance with prescriptive regulations
    - Compliance with performance-based regulations—

      - ✓ Finding and evaluating government and industry standards
      - ✓ Finding government and industry experts and expertise

- Compliance under safety system oversight

  - ✓ Assessing safety management systems—outside the checklist
  - ✓ Assessing levels of safety within the levels of compliance established by law
  - ✓ Assessing impact of new or differing technologies within compliance showings and findings
  - ✓ Voluntary and compliance philosophy programs with and without SMS
  - ✓ How technologies and data are used in showings and findings of compliance

- Alternative and/or multiple methods of establishing and finding compliance

  - ✓ Exemptions
  - ✓ Equivalent levels of safety
  - ✓ Special Conditions
  - ✓ Airworthiness Directives—finding an unsafe condition and approving alternative means of compliance
  - ✓ Development of guidance material by the agency and industry
  - ✓ Role of standard-setting organizations in establishing means of compliance or alternative means of compliance; agency role in those standard setting bodies, e.g., ASTM, RTCA, EUROCAE.

o Beyond minimum standards, how to show and find acceptance of additional levels of safety without direct regulatory connections

o International compliance and compliance activities

- Bilateral partners, airworthiness agreements, technical agreements, implementation procedures and other activities, with the most active first—TCCA, EASA, ANAC, UK-CAA

  - ✓ Negotiations and negotiators
  - ✓ Development of management plans and differences
  - ✓ Development of technical understandings and agreements

- Overview of bilateral partner systems and differences
- Potential partners and activities
- Impact of international regulations on showings and findings of compliance

o Overview of data/data collection role in compliance

- Methods and means used to collect data
- Development of new or combinations of data collection methods and technologies
- Evaluating the methods used within the context of the showing or finding of compliance or evaluating the safety elements within the applicable SMS or the NAS

o Introduction to analysis of data

- Sources of data
- Interrelationship with continued operational safety
- Hazard identification within the NAS
- Risk-based decision making within the regulatory system

o Further study of the agency's SMS standards and application

- For the agency—to enhance its full development and continuous improvement
- For the industry—to enhance the understanding of the role it plays in continued operational safety, and risk of non-compliance and mitigation

  o Cross-training

  - Instruction on any regulations that cross between FAA lines of business; part 21 pilot expectations to part 61 or 121 training requirements
  - To learn/understand the significance of each department and individual's roles, and when and where to seek input, information, external data, etc.

- Learning objectives/knowledge assessed

  o Oral, written, and practical testing of functions of employee's assigned role

  - Within the office
  - Within the department
  - Within the agency and DOT
  - Within the international aviation safety community

  o Applying regulations and other regulatory materials to a set of facts and circumstances, using alternative methods of compliance, new technologies, or to enhance the safety of an aircraft or fleet
  o Understanding the significance of international civil aviation authorities and standard-setting bodies in showing and finding compliance
  o Understanding the role of the FAA in standard-setting and international civil aviation authority difference identification, showing, and finding compliance within various international civil aviation regimes
  o Understanding how and why guidance and alternative methods show compliance so that the criteria can be applied to new methods and technologies—testing by development of one or more:

  - Issue paper
  - Exemption
  - Equivalent level of safety
  - Special condition
  - Guidance document—related or unrelated to showing or finding compliance to a regulation—

    ✓ Industry standard
    ✓ Best practices

Level 4 – Specific In-Depth Knowledge

Course(s) required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance in specific assignments that require knowledge of the interface among and between the plain language and background of the relevant regulation and the lines of business to ensure the life cycle of aviation products and articles are considered by both the applicant and the agency.

- Knowledge tools provided

- o In-depth learning opportunities on each part/subpart or section of the regulation and any other parts or sections cited within the part/subpart or section; w/could be combined with knowledge in past, current, and potential future technology at level 2 or 3 depending upon the expected compliance showing or finding responsibility.
- o In-depth learning opportunities in the agency's duties and responsibilities to ensure interdepartmental collaboration and coordination on development of requirements and/or standards for new or evolving technologies, higher levels of safety not specifically covered or prohibited by regulation
- o In-depth learning opportunities in SMS as it relates to the entire NAS and the role of the individual

    - ▪ Data mining and analysis—within the regulatory system as well as voluntarily-submitted information domestic and international
    - ▪ Continued operational safety within the individual's role, influence or requirements of other roles and the relationship to hazard identification and risk-based decision making within the NAS

- Learning objective/knowledge assessed

    - o Application of regulations and all means of compliance in complex certification environments requiring coordination and collaboration among and between agency divisions and offices and applicant divisions and offices
    - o Application of regulations and all means of compliance in development or application of international regulations, with or without a bilateral or technical agreement.

Will require equivalent level of knowledge in professionalism to ensure proper presentation of information and material.

APPENDIX B – Training Outline—Technical Knowledge

Level 1 – Basic Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Knowledge tools provided

  - What technologies are basic to industrial applications?

    - Structure
    - Power and its generation
    - Control
    - Automation

  - How are technologies controlled by the government?

    - Other industries controlled by the federal government and why
    - Refresher on prescriptive versus performance-based regulations

  - Development of standards—external and internal and alternative concepts
  - General history and perspective of the technologies used at the beginning of the government's control of industrial production and its relationship to aerospace
  - Technologies unique to aerospace and generally why that came to be.

- Learning objectives/knowledge assessed

  - Basic understanding of the interrelationship of government and industry in the development of industrial standards that are used to show compliance or establish a means of finding compliance with statutes and regulations.
  - Ability to find the person or department responsible for the technology, oversight, or compliance requirements.

Level 2 – Intermediate Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance responsible for overseeing or establishing technological standards or interfacing with applicants and certificate holders seeking information or approvals.

- Knowledge tools provided

  - Basic elements of engineering disciplines and principles inherent in all aviation design

    - Review of subparts of each airworthiness standard
    - Recognition of similar concepts and requirements across all aircraft types

  - Briefing on international and national organizations and agency standards
  - Federal requirements for standard setting and standard setting organizations—agency involvement and purpose to ensure the regulations are known and considered during deliberations; ensure objective and balanced result when applied within a regulatory context.

- Learning objectives/knowledge assessed

o Evaluate simple technological questions.

▪ What technologies are involved?
▪ What regulatory parts or persons are involved?
▪ What are the interfaces and lifecycle impact need to be considered?

o Relationship of standards used in each technology to the regulations and ability to show compliance with airworthiness standards throughout the lifecycle using different standards to show and find compliance.

Level 3 – Advanced Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance, e.g., showing or finding compliance in simple projects, including any interfaces among and between lines of business or lifecycle support programs.

• Knowledge tools provided

o In-depth information on the history and current applicable airworthiness standard by section and paragraph; interrelationship with all other lifecycle requirements in operations and maintenance, including potential for unsafe conditions to develop among and between the three elements.

o In-depth information on the variety and type of applicants and applications and the interrelationships of sophisticated and/or complex organizations.

o Applicable technologies, past, current, and potential to develop an understanding of the interrelationships among the old and new technologies (and certification bases) and the advancement in diagnostics and testing.

o Applicable standards past, present, and potential to develop an understanding and be able to find the history and interrelationships, use in other industries or similar applications and environments and applicability to projects and applicants.

o Information on other governmental agencies and international bodies working on the same or similar technology or standard—scope and variety of standard setting organization.

o Scope and degree of educational, research, agencies, committees, domestic and international bodies working on the same or similar technology, recommendations, or standards to understand the amount and degree of existing and developmental work available—

▪ Internal centers of excellence and research
▪ ARCS and FACA committee tasks
▪ International bodies—International Forum for Aviation Research could be a starting point
▪ Trade associations domestic and international

o Information on data mining and analysis related to the standard or technology applied, the certainty of data elements, and the validity of results.

o Application of technologies to the analysis of safety data, continued operational safety, hazard identification and risk-based decision making.

• Learning objectives/knowledge assessed

- o Evaluate simple projects to identify the applicable regulations and technical standards for showing and finding compliance.

- o Find and evaluate expertise of others regarding the applicable regulations and technical requirements of various projects.
- o Objective evaluation of technology used through hazard identification and risk-based decision making within the applicable airworthiness standard.

Level 4 – Specific In-Depth Knowledge

Course(s) required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance with specific assignments that require knowledge of the complexity and interface among and between the plain language and background of the relevant regulation and the past, present, and future technologies, research, and standards to ensure the life cycle of aviation products and articles are considered by both the applicant and the agency.

- Knowledge tools provided

  - o In-depth learning opportunities on each past, current, and future or potential technology combined with Regulatory Compliance Knowledge at level 2 or 3 depending upon the expected compliance showing or finding responsibility.
  - o In-depth learning opportunities on the evaluation and analysis of data available within and outside the agency to enhance continued operational safety, analysis of technological approaches to compliance based on hazard identification for effective and efficient risk-based decision making.
  - o In-depth learning opportunities on performance engineering principles internally and externally to establish knowledge in finding compliance with appropriate mitigation elements under the SMS and the NAS.
  - o In-depth learning opportunities on acceptance criteria for advanced technologies that enhance safety to encourage voluntary usage within the regulated environment.
  - o In-depth learning opportunities in statistical analysis and validity of data.

- Learning objectives/knowledge assessed

  - o Evaluation of several complex projects – establishing how compliance was found with specified airworthiness standards based upon an assessment of the technology available and/or applied.
  - o Objective evaluation of technology used within the certification requirements.
  - o Objective evaluation of continued operational risk, with technological or regulatory mitigation analysis.
  - o Objective evaluation of statistical data using several methods of validation and analysis.

May require equivalent level of knowledge in professionalism depending upon the corporate (government) requirements or regulations (e.g., OPM requirements or corporate structure).

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APPENDIX C – Training Outline—Professional Development

Level 1 – Basic Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Knowledge tools provided

  - Use of computer (hardware)
  - Use of ubiquitous software (electronic mail, calendars, word processing, databases, and data entry)
  - Purpose and use of corporate or line of business software—how it relates to the compliance requirements
  - Standards for correspondence and inter-departmental communications
  - Basic grammar and sentence structure
  - Basic reading comprehension
  - Basic time and project management

- Learning objectives/knowledge assessed

  - Purpose of corporate or line of business software
  - Creating and saving documents and data
  - Creating, updating, and managing calendars and tasks
  - Internal and external communication capabilities

Level 2 – Intermediate Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance that interface with more than one person or department, internally or externally.

- Knowledge tools provided

  - Intermediate ability to manipulate electronic mail, calendars, word processing, databases, and data entry to maximize time and project management
  - Comprehensive use of correspondence and inter-departmental communications
  - Human factors and inter-office conduct and interface with the public

- Learning objectives/knowledge assessed

  - Simple task and project management
  - Clear written communications

Level 3 – Advanced Knowledge

Course required for any agency or industry employee involved in or responsible for applications for certifications, approvals or delegations in design, production, operations, and maintenance that must interface with others or are responsible for overseeing the work or communications of others internally or externally.

- Knowledge tools provided

- Personnel management within the corporate or government entity, including hiring, growth, and disciplinary criterion.
- Managing and delivering training and mentoring
- Departmental policy and procedure development, implementation, and management
- Cross department and lines of business communication and management
- Management of communications among and with principals internally and externally
- Presentation development and delivery skills

  - Preparation—outline and define
  - Presentation—develop slides, papers, etc.
  - Delivery—rehearsal and timing techniques and practices

- Relational database development and management—from simple to complex depending upon duties and responsibilities, but personnel at this level should understand more than just concepts to manage the development or interface internally and externally
- System level information on SMS development, implementation, and continual improvement to enhance continued operational safety, data mining and validation, hazard identification within the NAS and risk-based decision making

- Learning objectives/knowledge assessed

  - Management of self and others towards project development and success
  - Ability to ensure standardization and application of regulatory requirements within a unionized environment, including documentation of progress, remedial, and disciplinary actions.
  - Develop, implement, and manage long-term and/or complex projects among and between department personnel and internal and external principals
  - Develop and present presentation for public consumption

Level 4 – Specific In-Depth Knowledge

Course(s) required for management personnel and for persons responsible for managing large projects or communications in crisis or negative situations associated with applications for certifications, approvals or delegations in design, production, operations, and maintenance.

- Knowledge tools provided

  - Learning opportunities on project and personnel management
  - General information on other agencies and the method of communicating among and between DOT models and other federal and international agencies, examples:

    - NTSB
    - DOD
    - EPA
    - OSHA
    - Bilateral partners
    - Legislative offices domestic and international
    - Executive offices

- In-depth information on relationship and responsibilities of other divisions within the agency—how issues that impact more than one division can be resolved in accordance with the regulatory parameters and political realities
- In-depth information on the management of projects dictated by legislation, executive orders, or negative media.
- Learning opportunities in professional presentations to the public (certificate holders to congressional or executive representatives and the media)
- In-depth information on effective implementation of SMS concepts to the division and the agency
- In-depth information on effective management of the policies and procedures to ensure continued improvement and streamlining using

  - Data mining and assessment
  - NAS hazard identification
  - Risk-based decision making

- Opportunities to communicate with peers from other agencies or industries with similar positions and interests; share regulatory and technical knowledge, programs, and improvements.

Appendix D – Government Audit and Report Review

Working group members reviewed myriad reports and audits of the Federal Aviation Administration since 1989. Excerpts from ones that referenced training specifically are listed.

1. US Government Accounting Office. (1989*) FAA Aviation Safety Inspectors are Not Receiving Needed Training*. (GAO Publication.RCED-89-168) Washington, D.C. U.S. Government Printing Office) https://www.gao.gov/assets/220/211750.pdf.

   Operations inspectors have not received recurrent flight training and whose qualification to make flight checks have expired.

2. US Government Accounting Office. (June 6, 1990) Serious Shortcomings in FAA's Training *Program must be Remedied.* (GAO Publication RCED-90-91). Washington, D.C.: U.S. Government Printing Office). https://www.gao.gov/assets/t-rced-90-91.pdf.

   FAA is not fully using its existing training capability because it has not established clear accountability for class attendance. (p.2)

3. National Transportation Safety Board. (1994). Aircraft Accident Report: Controlled Flight into Terrain, Federal Aviation Administration, Beech Suer King Air 30/F, N82, Front Royal, Virginia, October 26, 1993, AAR-94/03, (Washington, DC, 1994).

   Probable Cause: …The failure of the Federal Aviation Administration executives and managers responsible for the FAA flying program to: 1) establish effective and accountable leadership and oversight of flying operations; 2) establish minimum mission and operational performance standards; 3) recognize and address performance-related problems among the organization's pilots; and 4) remove from flight operations duty pilots who were not performing to standards.

4. U.S. Congress, House of Representatives (2002). Committee on Transportation and Infrastructure, Subcommittee on Aviation, Adequacy of FAA Oversight of Passenger Aircraft Maintenance: Hearing Before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, 107th Cong., 1st sess., April 11, 2002 (prepared statement of Alexis M. Stefani, Assistant Inspector General for Auditing, U.S. Department of Transportation, Office of Inspector General), https://www.oig.dot.gov/sites/default/files/cc2002146.

   Correcting common threads that limit the effectiveness of FAA's oversight programs. As far back as 1987, our office and the General Accounting Office (GAO) have found persistent problems in the collection and use of safety data, inspector training, and correcting identified safety problems. FAA's own internal reviews have identified the same problems." (p.2)

5. US DOT Order 1380.49D (2002) *Staffing standards for aviation safety inspectors* (manufacturing). Washington DC. https://www.nap.edu/read/11742/.

   In all the above respects, the current ASAM model is deficient. The holistic approach, while somewhat more promising, never materialized, and in view of its weaknesses does not appear to merit revisiting. What performance measures currently exist are at best of dubious quality and utility." (p 88-89)

6. US Government Accounting Office (2003) *Human Capital management: FAA's reform effort requires a more strategic approach* (GAO Publication No. 03-156). Washington, D.C. U.S. Government Printing Office. https://www.gao.gov/assets/gao-03-156-highlights.pdf.

   FAA has also not gone far enough in establishing linkage between reform goals and overall program goals of the organization. GAO found that the lack of these elements has been pointed out repeatedly in evaluations of FAA's human capital reform effort, but FAA has not developed specific steps and time frames by which these elements will be established and used for evaluation. Incorporation of these elements could also help FAA build accountability into its human capital management approach.

7. USGAO. (2004) *Aviation Safety: FAA needs to strengthen the management of its designee programs* (GAO-05-40). https://www.gao.gov/products/gao-05-40.

   The Secretary of Transportation should direct the FAA Administrator to develop mechanisms to improve the compliance of FAA program and field offices with existing policies concerning designee oversight. The mechanisms should include additional training for staff who directly oversee designees. As part of this effort, FAA should identify best oversight practices that can be shared by all FAA program and field offices and lessons learned from the program evaluations and incorporate, as appropriate….

8. USGAO (2005) Aviation Safety: *FAA management practices for technical training mostly effective: Further actions could enhance results.* (GAO 05-728). https://www.gao.gov/products/gao-05-728.

   Congress and GAO have long-standing concerns over whether FAA inspectors have enough technical knowledge to effectively identify risks.

9. Federal Aviation Administration. (December 7, 2005) FAA Has Opportunities to Reduce Academy Training time and costs by Increasing Educational Requirements for Newly Hired Air Traffic Controllers. Report Number AV-2006-021. https://www.oig.dot.gov/sites/default/files/FINAL_12-7-05_2.pdf.

   …found that FAA could reduce new controller training time and costs by identifying specific coursework conducted at the FAA Academy that could be discontinued as part of Government-provided training and instead making the coursework a prerequisite to employment as an FAA controller. For example, a portion of initial qualification training at the Academy includes classroom instruction on general aviation topics, such as the dissemination of weather information, traffic separation, and visual operations. Those topics are also provided as part of existing aviation programs at colleges and universities….

   Colleges and Universities Offer Courses Similar to Those Taught at the FAA Academy. At five colleges and universities we visited, we found that many classroom subjects currently taught at the FAA Academy.

10. National Research Council of the National Academies. (2007). Committee on Federal Aviation Administration Aviation Safety Inspector Staffing Standards. "Staffing Standards for Aviation Safety Inspectors" Washington, DC. https://doi.org/10.17226/11742.

The FAA may not be able to staff optimally until individuals with the requisite interpersonal and communication skill levels (achieved via either training or selection) are in place.

11. U.S. Congress, House of Representatives, Transportation and Infrastructure Committee Subcommittee on Aviation. (June 11, 2008). Key Issues Facing the Federal Aviation Administration's Controller Workforce. Statement of The Honorable Calvin L. Scovel III, Inspector General U.S. Department of Transportation. https://www.oig.dot.gov/sites/default/files/WEB_FINAL_6-9-08_revised_July_2008.pdf

   …we found there is significant confusion at the facility level. Facility managers, training managers, and even Headquarters officials were unable to tell us who or what office was responsible for facility training. We recommended that FAA clarify responsibility for oversight and direction of the facility training program at the national level and communicate those roles to facility managers.

12. US DOT. (2011). FAA Needs to Strengthen its Risk Assessment and Oversight Approach for Organization Designation Authorization and Risk-Based Resource Targeting Programs. Report Number AV-2011-136. (Washington DC). https://www.oig.dot.gov/sites/default/files/FAA%20ODA%206-29-11.pdf.

   While the ODA program is relatively new, we identified potential vulnerabilities in FAA's oversight and training….

13. U.S. Congress, House of Representatives, Committee on Transportation and Infrastructure, Review of FAA's Certification Process: Ensuring an Efficient, Effective, and Safe Process: Hearing before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, 113th Cong, 1st sess., October 30, 2013. https://www.govinfo.gov/content/pkg/CHRG-113hhrg85301/html/CHRG-113hhrg85301.htm.

   GAO reports that upwards of 90 percent of FAA's certification activities were performed by designees. Therefore, FAA personnel must have tools and the training to properly assess risk so that they are involved when needed to be and are prepared to step up their involvement and certification activity when warranted.

   Many of the recommendations…centering on improving training for FAA personnel and improving communication between FAA and industry. For example, the panel recommended that the FAA develop a consolidated master database for regulatory policy and guidance for commercial aviation.

14. GAO. (2014). Additional oversight planning by FAA could enhance safety risk management. GAO -14-516. https://www.gao.gov/assets/670/664402.pdf.

   GAO recommends that FAA develop a plan for overseeing industry SMS implementation that includes providing guidance and training for FAA inspectors by the time final rules are published.

   Representatives from nine of the twenty stakeholders GAO Interviews cited concerns that FAA inspectors may not be adequately trained to oversee Safety

Management system (SMS) activities at US Carriers. As a result, the FAA instituted increased SMS training for its inspectors.

15. DOT Office of Inspector General Audit Report. (2015) *FAA Lacks an Effective Staffing Model and Risk Based Oversight Process for Organizational Designation Authorization* (Washington DC) Report Number: AV-2016-001. https://www.oig.dot.gov/sites/default/files/FAA%20Oversight%20of%20ODA%20Final%20Report%5E10-15-15.pdf.

> Ensuring adequate staffing levels and providing inspectors and engineers with the necessary guidance and tools will be key to successfully transitioning to a new oversight approach. Unless FAA leverages available tools such as company self-audits and FAA assessment results to target its oversight, the Agency cannot increase efficiency while closely monitoring the highest-risk areas of aircraft certification.

16. US DOT Office of Inspector General (2019) *FAA Needs to Improve its oversight to Address Maintenance Issues Impacting Safety at Allegiant Air.* (Washington DC). https://www.oig.dot.gov/sites/default/files/FAA%20Oversight%20of%20Allegiant%20Air%20Final%20Report.pdf.

> FAA's Root Cause Analysis Training is Insufficient.

> Modify training, as appropriate, based on the review and require inspectors to complete the course(s) or offer inspectors access to industry-based training programs.

> Recommend: Perform a comprehensive review of FAA's root cause analysis training to ensure it meets Agency expectations. Modify training, as appropriate, based on the review and require inspectors to complete the course(s) or offer inspectors access to industry-based training programs.

17. May 2, 2019. Letter from Daniel Elwell, Acting Administrator, Federal Aviation Administration to Roger F. Wicker, Chairman, US Senate Committee on Commerce, Science and Transportation.

> …concerns raised…ultimately revealed ambiguities in the FAA's policy on ASI training requirements and…an opportunity to improve our internal systems and procedures.

18. September 23, 2019. Letter from Henry J. Kerner, special counsel, US office of special council, Donald J. Trump, President of the United States.

> FAA's official responses to Congress appear to have been misleading in their portrayal of FAA employee training and competency.

> Recommend: Perform a comprehensive review of FAA's root cause analysis training to ensure it meets Agency expectations. Modify training, as appropriate, based on the review and require inspectors to complete the course(s) or offer inspectors access to industry-based training programs.

19. Letter from Roger F. Wicker, Chairman, U.S. Senate Committee on Commerce, Science, and Transportation, to Daniel Elwell, Acting Administrator, Federal Aviation Administration, July 31, 2019, https://www.commerce.senate.gov/services/files/A22129F6-E00F-4D4D-B22A-65DAF61B2227.

> Letter requesting un-redacted reports of investigations related to three key whistleblowers as well as documentation to support the FAA's claim that ASI's serving on the Boeing MAX FSB were fully qualified for the tasks that they performed.

20. US Senate Committee on Commerce, Science and Transportation. (2020) Aviation Safety Oversight. Committee Investigation Report Aviation Safety Oversight. https://www.commerce.senate.gov/services/files/FFDA35FA-0442-465D-AC63-5634D9D3CEF6.

> OSC found that of the 22 ASI's identified in the whistleblower complaint, sixteen of them had not completed required formal training classes. Of these sixteen ASI's three of them served on the Boeing 737 MAX FSB." (p 28)

> FAA Lacks an Effective Staffing Model and risk-based oversight process for organization designation authorization (issued October 2015) (p 36)

> FAA has not effectively Overseen Southwest Airlines' Systems for Managing Safety Risks (issued February. 2020) (p 36)

> Senior managers in FAA Flight Standards may lack technical knowledge and experience to effectively lead aviation safety regulatory oversight programs" (p 66).

> …many ASIs had not completed FAA 'Principles of Evaluation for Operations ASIs'…which serves as foundational training for all ASI…(p 73).

> FAA Senior managers have not been held accountable for failure to develop and deliver adequate training in Fight Standards despite repeated findings of deficiencies over several decades.

Appendix E – Working Group Memorandum on IA Refresher Training

M E M O R A N D U M

DATE: June 17, 2021

FROM: Workforce Development and Training Task Working Group

TO: Safety Oversight and Certification Advisory Committee Subcommittee

SUBJECT: Inspection Authorization Refresher Course Acceptability

The working group continues to refine its original recommendation for an AVS-wide policy on acceptable training programs in as many settings as possible. In the meantime, the members believed that providing an example of how the policy could be applied would help ensure the edits to the wider policy are appropriate.

FAA administration of Inspection Authorization renewal requirements under 14 CFR § 65.93(a)(4) unnecessarily burdens agency personnel, training practitioners, and IA holders. Government and industry would benefit from process simplification based on the plain language of the regulation allowing renewal through refresher course completion.

The rule requires IA holders to complete one of five annual activities to remain qualified for reapplication at the end of a two-year authorization period. Section 65.93(a)(4) makes eligible a person who has "[a]ttended and successfully completed a refresher course, acceptable to the Administrator, of not less than 8 hours of instruction."

FAA guidance regarding elements that must be "acceptable to the Administrator" acknowledges "the FAA's active review and acceptance prior to use is not normally required." An IA renewal refresher course can therefore be acceptable under § 65.93(a)(4) without the agency "actively" reviewing it, but instead establishing and auditing to criteria for acceptability.

Unfortunately, FAA procedures found in Order 8900.1, Vol. 3, Ch. 56 establish a complicated system mandating industry training providers submit extensive applications for individual course acceptability, valid only for two years before mandatory re-application. Though current policy allows for situations "in which [it] is not necessary for the [FAA] to review, accept, and issue an acceptance number to industry or FAA-conducted IA renewal training courses," only manufacturers, manufacturer-authorized representatives, and certain government offices may provide training under this exception.

In February 2020, the FAA announced it was developing new IA Refresher Course Provider guidance and application instructions. During the resulting pause, agency personnel have requested industry input regarding program burdens. Based on that feedback and mandates to improve aviation training availability, the government should use this opportunity to simplify its policies for course acceptability to conform with § 65.93(a)(4), reduce complexity of its own oversight, and increase flexibility for training providers to adapt to changing needs.

Improving existing agency policy will require—

(1) Simplifying Order 8900.1, Vol. 3, Ch. 56 to remove individual course application requirements and explain how to manage existing courses until such expire.

(2) Updating the Inspection Authorization Information Guide (FAA-G-8082-19) to instruct IA holders in demonstrating acceptability of completed training.

(3) Reorganizing information presented on faasafety.gov, including IA renewal information available through the "Maintenance Hangar" as well as in the online library.

If the Subcommittee agrees, draft language for the first two items can become part of the recommendation to the full Committee.

The AVS-wide draft policy received substantive comment that is still being reconciled. The working group is hopeful by providing this example, the comments received can be incorporated more efficiently.

Appendix E -- FAA Letter to Providers of IA Refresher Training

U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave., S.W.
Washington, D.C. 20591

September 17, 2021

Dear IA Refresher Course Providers and Applicants,

The FAA is writing new guidance that improves the process for IA refresher course providers in the form of an Advisory Circular (AC). Concurrently, we are also revising FAA Order 8900.1, Volume 3, Chapter 56, Section 1 to synchronize with the new AC and seeking approval from the Office of Management and Budget (OMB) for the new course acceptance form. Starting September 30, 2021, all currently active FAA accepted IA refresher courses will receive a one year extension from their expiration dates. Courses that expired prior to September 1, 2019 were not extended as mentioned in the memorandum dated February 10, 2020.

As a response to the COVID 19 public health emergency and requests from IA Refresher Course Providers, the FAA authorized "current" IA Refresher Course Providers to revise their course material, as appropriate to meet social distancing recommendations and the needs of Inspection Authorization holders. Current IA refresher course providers may update or revise their IA refresher courses without additional FAA review and acceptance. Acceptable revisions include, but are not limited to:
- Updates and revision to course content
- Changes in course instructors/presenters
- Changes to presentation date and or location
- Change of delivery method from lecture to on-line media methodologies, to include (web-based, live-streaming, tele-conferencing)

IA refresher course providers must continue to perform all existing administrative requirements.
- Course providers must maintain a list of attendees by name and address for each course given, maintain each list for 36 months, and make it available to any FAA office upon request.
- Course providers are required to notify the local FSDO/IFO manager by letter or email the date, time, and location 30 days prior to the training event.
- Course providers must issue certificates of completion to attendees who successfully attend the course.
- Certificates of completion must include all required elements. (Attendee name, date of attendance, number of credible IA refresher hours of instruction, course title, IA refresher course providers name, FAA IA refresher course acceptance number and the signature of IA refresher course provider POC or other authorized person)

Until the new guidance is published, the FAA will not be accepting applications for new IA Refresher courses. New applicants are encouraged to review FAA Order 8900.1 Volume 3 Chapter 56 Section 1 paragraph 3-4518(C) to consider if they could use one of the exceptions listed in the guidance for their course.

The Master list of FAA accepted IA refresher courses is published on the FAA Safety Program

website, FAASafety.gov, under "Maintenance Hangar - IA Renewal Course List":
https://www.faasafety.gov/WINGS/pub/IATrainingProviders/IaUnderMaint.aspx

Sincerely,

For Jackie Black

Digitally signed by KIM O
DAVIES
Date: 2021.09.17 11:59:57
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Jackie L. Black

Manager, Aircraft Maintenance Division, AFS-300
Office – (202) 267-1675