*Product of the NBAA Safety Committee - Business Aviation Pilot Training Project Team*

*V1.1*

*13 May, 2014*Background

In August of 2011, the NBAA Safety Committee developed a project team to evaluate the training models available to business and corporate aviation flight departments. This project team has been exploring other training paradigms that have the potential to enhance the training experience, making the training more applicable and therefore more effective for flight operations.

In the analysis phase of the project, the team discovered four key issues surrounding business aviation pilot training as follows:

- There has been a migration from learning to checking at 142 centers
- The 61.58 is often repeated and predictable
- Emphasis is needed on risk awareness, aviation decision making, scenario based training, and
- Excellent infrastructure currently exists at 142 centers to address future needs

During a two year period, the project team collaborated with stakeholders including; the association member operators, training experts, the FAA, part 142 centers and the NTSB to develop a strategic game-plan to effect systemic change in business aviation pilot training. Key elements of the strategic game-plan are:

- Develop Strategic Partnerships with regulators
- Encourage Evidence based, Data Driven Training
- Develop Modern Practical Training Methodology
- Effect Cultural Shift towards continued learning

The Training Advisory Committee has expanded its reach to include all members of flight operations – leadership, pilots, flight attendants, mechanics, schedulers & dispatchers, and

administration. These **"team members"** are all integral to a successful and safe flight operation.

One of the most important areas of work this project team has pursued is the development of a concept called Training Management Systems, or TMS, for business and corporate aviation flight departments. The association intends to promote and support operators in pursuit of TMS

adoption is two key areas; by creating an association Training Advisory Committee[1], and, actively promote and support the FAA Aviation Safety Information Analysis & Sharing program. The Training Advisory Committee will serve as the conduit for information and identified training needs between members and the General Aviation Joint Steering Committee[2].
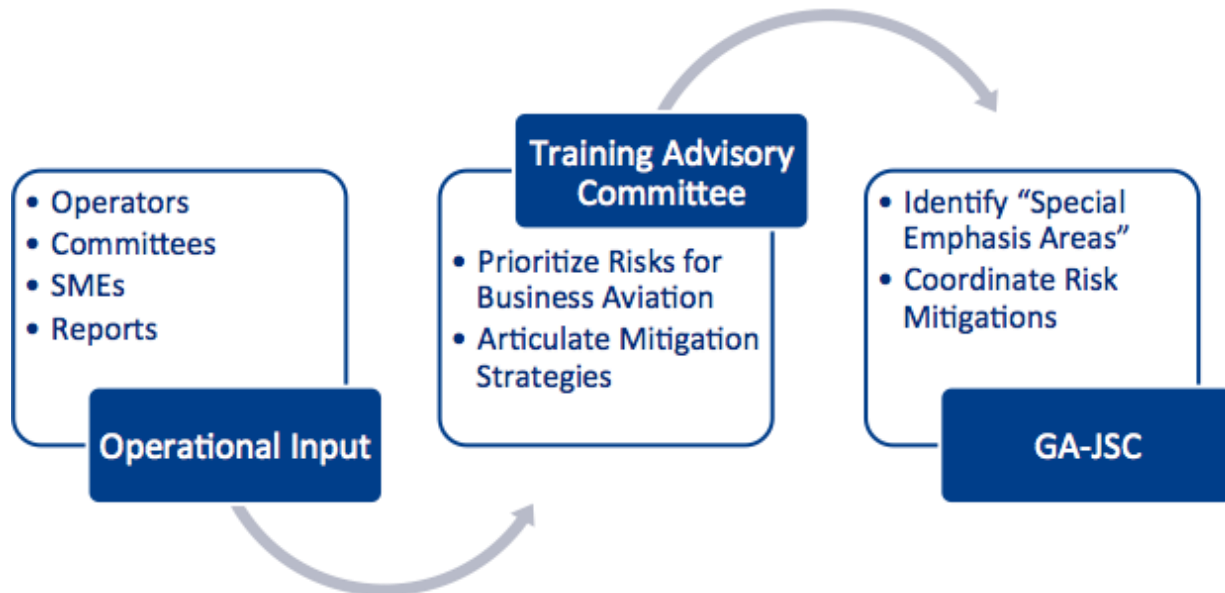


*Training Advisory Committee - Workflow*

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[1] Training Advisory Committee - initially will be a sub-committee of the Safety Committee to facilitate administrative support.
[2] General Aviation Joint Steering Committee - is the primary vehicle for government-industry cooperation, communication, and coordination on GA accident mitigation.

# CHAPTER 1 - Overview of Training Management Systems (TMS)

# CHAPTER 2 – TMS Development and Implementation

# CHAPTER 3 – Elements of a TMS

# Chapter 4 – Using and Maturing Your Training Management System

# APPENDIX A: Links to helpful training resources and materials

# *CHAPTER 1 - Overview of Training Management Systems (TMS)*

## INTRODUCTION

A Safety Management System's primary function is to proactively identify hazards/threats and to then manage the risk of those identified hazards/threats to a level as low as reasonably practical. Operators with an effective SMS have the ability to identify the threats specific to their operation. One of the most effective tools available for operators to mitigate the level of risk of certain identified threats is training; very specific training, targeting the threats present in their operations.

TMS is a systematic approach to the development of a training plan, implementation of that plan, management of the plan, and then the evaluation of its effectiveness. The result will be recommendations for improvement to the training plan. Everyone is a participant in the process; everyone gives feedback to help improve the process. This dynamic process is a primary tool that can be used to mitigate the levels of risk for identified threats to the department.

A flight department's TMS should be tailored for the specific needs, capabilities, and missions of that flight department. Safety will be enhanced as operators take a more proactive role in developing training objectives that are based on the threats present in their operation. A TMS can be applied to the training needs and requirements of all flight department.

The primary objective of a TMS is to ensure an organization takes full advantage of the "training tool" within their SMS.

A TMS provides a systematic approach to:

- Identify and document the training needs within a flight department (both required training and supplemental training).
- Determine how the identified training needs will be met.
- Implement a training plan to meet those training needs as effectively as possible.
- Document the training plan.
- Finally, ensure that the training administered was effective and met the identified training needs of the flight department.

A TMS includes internal or "in-house" training as well as the training received from outside vendors. *The scope of training within flight departments varies greatly and is based on the size of a flight department and resources available; therefore, a TMS is scalable to allow operators of any size and complexity to most effectively meet their training needs.*

A successfully implemented TMS will provide the necessary competencies and qualifications to flight department personnel to safely operate within today's complex environments. An effective TMS leverages the safety risk management activities of the operator's SMS.

The term "evidence-based" training is commonly used to describe training that is based on the operator's identified threats. In other words, training objectives are based on *evidence* derived from the operator's threat/hazard identification process.

To make this training even more effective, operators should periodically review how other operators are modifying their training and what evidence based items they are incorporating, to maximize the quality and pertinence of training conducted. One key to promoting a positive safety culture and reducing the likelihood of accidents is actively learning from the multitude of other aviation departments – this also results in a savings of time and resources.

The TMS process must be documented in the appropriate manual. Generally a flight department's Operations Manual would be used to document the TMS process. Some flight departments have a separate Training Manual, in which case the TMS process should be documented there.

This TMS guide, combined with other literature and resources provided by NBAA provides any operator with an off-the-shelf framework for TMS development.

## GUIDE MAINTENANCE

This guide follows a basic building block approach to introduce the concept of a Training Management System. This guide provides the reader insight into the initial design and architecture of an operating practice to utilize training as a primary tool to mitigate levels of risk associated with identified threats.

This guide is not a one-time publication but the first step of an on-going effort to provide templates and tools for any size flight department to implement.  As with the introduction of any new concept, time and experience will allow for the best practices to be determined and continuously improved. The development of this guide is sourced from several aviation industry sub-groups: including business, commercial and military aviation operators, as well as input from the training vendors, aircraft manufacturers, the NTSB, and the FAA. The future development and improvement of this guide will be made possible by drawing from the best practices of these and similar resource groups.

# CHAPTER 2 – TMS Development and Implementation

Flight department personnel must meet continuous training criterion in several technical areas. Ensuring all training requirements are identified and accomplished requires organization, attention to detail, and frequent monitoring (larger the department, larger the task). For flight departments that have implemented an SMS, the steps of establishing a TMS will be very similar and supportive of the SMS. In fact, a TMS is a vital component of an effective SMS; designed under the same basic principle of an SMS, which is to reduce the level of risk of identified hazards to as low as reasonably practical. A TMS will allow a flight department to take full advantage of training opportunities to mitigate levels of risk.

A key to the success of a TMS is the commitment of flight department leadership personnel. Regular communication about the TMS should be made available to all flight department personnel. An effective TMS will be based on the input of the front line personnel. Who better to point out the training needs of a flight department than the folks "at the pointy end of the spear?" Many flight departments have some form of training program/s already in place. A TMS utilizes a systematic approach towards the training that takes place within a flight department. A TMS will provide operators a means for decision makers to review the methods and effectiveness of the training options that have been put into place. A key benefit of developing a TMS is the ability to track and evaluate the effectiveness of the training programs in place and to modify them as necessary.

## STEPS TO BUILD/IMPLEMENT/EVALUATE A TMS

### Commit to TMS
Make a commitment, as a company, and as a flight department to pursue the highest quality training possible. Flight department and company leadership must understand the concept and benefits of a TMS. Leadership commitment and involvement of all flight department personnel in TMS development are qualities necessary to gain acceptance of the TMS by all flight department personnel.
If leadership simply "delegates" TMS to a training officer or other staff and does not continually express the importance, the TMS effort will not be effective.

### Educate
Spend time educating flight department personnel on TMS, and its associated benefits (time, money, efficiency, risk reduction, and as a vehicle to provide feedback to leadership to ensure valid, meaningful, high quality training).
Employees normally greet effective and well organized training with enthusiasm.

**Assign the task**

Much like an SMS, the accountability for the creation and implementation of a TMS should be a line management position. Establish a TMS team within the flight department to lead and oversee the development of the TMS. The TMS team will have the authority to create and operate the TMS and ensure the resources expended result in an optimal TMS for the flight department.

## STEPS TO IMPLEMENTING A TMS

Perform a gap analysis to track what is already in place from a flight department training perspective, with focus on the training activities that address the specific threats within the unique environment of the flight department. Use the following as a guide in determining your pre-existing training assets.

**TMS Gap Analysis**

• Do you presently have a functioning safety management system?
A functioning SMS will assist with identifying the risks to your operation. Use the system to target training needs by conducting an aviation services risk analysis to isolate threats. Identify specific threats that can be mitigated with training. You can find more information about SMS here: http://www.nbaa.org/admin/sms/

• Do you use training to address/mitigate threats, when appropriate?
Simulator training is an extremely effective tool to mitigate the level of risk of the potential consequences of identified flight related threats/hazards.  Flight departments should work closely with their training provider to address the most significant threats/hazards to their operation.

• Do you leverage resources available to help you develop training programs?
The NBAA offers a comprehensive training program for technically advanced aircraft which can provide detailed guidance on how to develop a program. You can find it here:
http://www.nbaa.org/ops/safety/vlj/
You should partner with your training provider to discuss your needs and learn about

"Alternative Recurrent" and other training opportunities.

• Do you have an Operations Manual that identifies specific policy for safety, standard operating procedures and training?
Documenting your procedures anchors your program in excellence. You can find more information and detailed guidance here: http://www.nbaa.org/admin/sms/manual/

• Do you share your SOPs with your training provider?

SOP compliance is one of the most effective ways to elevate the level of safety within a fight department. Training with current SOPs in the simulator reinforces consistent behavior and serves to develop consistent performance.

- Has your flight department developed pre-study requirements?

Look for videos, articles, etc. that relate to the identified threats to your operation. Think about making the related videos and articles required viewing/reading prior to simulator training.  One potential source for these videos is your training provider. Most training providers have a library of videos and computer based training modules. Preparing for training will greatly enhance the experience.

- Has your flight department developed in-house training?

You should not rely upon your training provider to deliver all of your training needs. Training can be conducted year round and can be used to develop skills that go beyond what is typically delivered at training centers specifically targeted to the needs of your operation. Think about developing in-house training for items such as aircraft performance, SOP's, winter operations, summer operations, and decision making. Develop a "training culture" and promote a learning environment.

- Does your flight department engage in mentorship activities?

Does a new hire pilot or a pilot that has just checked out on a new aircraft receive some type of supervised operating experience (SOE)?   SOE can be used to reinforce your flight department's SOPs and to ensure the newly trained pilot fully understands the operating philosophy of your flight department.

- Does your flight department engage in benchmarking activities?

Find out what your peers are doing. Participate in regional forums and roundtable groups to discover new and innovative training solutions. You can find more information on regional forums here: http://www.nbaa.org/events/forums/

- Does your flight department measure the effectiveness of the training received? Did the training received meet your objectives? How can you verify that the training had the desired effect?

A flight department should tailor the feedback/critique tool to obtain the specific data the flight department is most interested in getting.  Seek feedback from your pilots; discuss ways to improve training with them. Provide detailed feedback to your training partners and hold them accountable. Get engaged in your training!

**Developing your System**

Utilize the elements below (described in chapter 3) to develop a TMS.

- Training Objectives
- Training Development
- Training Implementation/Documentation
- Training Effectiveness
- Training Modification

**Track and evaluate TMS activities**

TMS activities must be monitored and modified as necessary. The concept of continuous improvement definitely applies to TMS. Perform periodic assessments of the TMS in relation to the stated training objectives.  This will help ensure the TMS is effective, efficient, and meeting the flight department's expectations.  In other words, are identified threats being effectively mitigated as result of the TMS?

Lessons will be learned as a TMS evolves, allowing for opportunities to tailor the TMS to the specific training needs of the flight department.

The results of the periodic TMS evaluations should be documented and regularly reviewed by the flight department's leadership.

## QUICK REFERENCE TABLE FOR TMS IMPLEMENTATION

| ✔ | Action |
|---|---|
| | Brief the purpose, benefit, process, and required participation of implementing a successful TMS program |
| | Ensure the TMS program, protocols, and expectations are formally written and distributed as a reviewed and approved organizational document |
| | Review the threats identified from the Safety Management System's hazard/threat identification process |
| | Identify and document the training needed to address the identified threats |
| | Validate proposed training needs are based upon evidence data |
| | Match training needs to financial funding, work projects to assigned personnel etc. |
| | Develop specific training objectives based upon both Required Training and Supplemental Training that is unambiguous, achievable, and measurable |
| | Develop and implement the desired training |
| | Develop and implement a mechanism and the metrics to allow feedback to ensure training was effective |
| | Review trends within the SMS reporting programs to assist with measuring the effectiveness of the TMS programs |
| | Develop and implement a mechanism to periodically conduct a peer review among similar flight departments or safety organizations.  Co-sharing ideas, concepts, programs provides a mutual support network supports both TMS and SMS protocols. |
| | Assign responsibilities as required to ensure frequent monitoring of the program, as indicated by the on size and complexity of the TMS program |
| | Develop and implement a mechanism to update, modify, and expand the TMS based upon results, feedback or other variables |
| | Document all changes to the TMS program to ensure impact of change analysis can be completed on all related materials, while providing an audit trail for procedures and an historical analysis of data |
| | Develop and implement a periodic schedule to brief flight department personnel on the success and/or status of the TMS milestones |
| | Provide an opportunity to brief, explain, and present the flight department's training plan to all applicable personnel |
| | Develop and implement a periodic schedule to brief flight department personnel on the success and/or status of the TMS milestones |
| | Develop and implement opportunities to combine personnel professional development with internal training requirements |
| | Foster a positive, engaged relationship with Training Provider |
| | Develop and implement as needed a Train the Trainer program |

# *CHAPTER 3 – Elements of a TMS*

The 5 elements of a TMS are defined in this chapter.  They are listed and described in chronological order.



## ELEMENT 1 = TRAINING OBJECTIVES

Training objectives are developed collaboratively by the stakeholders to meet the flight department's training needs. Training objectives have two components: *Required Training* and *Supplemental Training*.

Generally speaking, required training is dictated by the regulations under which the flight department operates. Annual simulator visits (FAR 61.58) are an example of required training.  It should not be difficult for a flight department to list its <u>required</u> training objectives…they are what they are.

<u>Supplemental</u> training objectives are not as straight-forward as the required training objectives.

Supplemental training objectives are developed based on the specific threats to an operator. An effective SMS will identify threats present within a flight department's operation. Once the SMS has identified the threats, then the TMS goes into action. One of the most effective tools to mitigate the level of risk of an identified threat is training. If it is determined that required training events (e.g.: 61.58) will not adequately address

the identified threats of the flight department's operation, the decision should be made to utilize some form of supplemental training to address those threats.

At this point we have reviewed the first element of a TMS which is to create *training objectives* to meet the training needs of a flight department.

The next step is to look into the *training development* required to meet the training objectives.

## ELEMENT 2 = TRAINING DEVELOPMENT

Once training objectives have been created, the next step is to develop the training to meet those training objectives.  Some of the training objectives will be achieved during the required training events ( e.g.: 61.58). However, the training objectives that cannot be met by the required training events will necessitate the development of supplemental training.

Many flight departments do not have the manpower available to develop in-house training to meet the supplemental training objectives.  In that case, the flight department should consider seeking an outside source to provide the training development needed to meet the supplemental training objectives. There are several sources available to meet the supplemental training needs of flight departments. One of those sources is the training provider the flight department is already using to meet the *required* training objectives.  That training provider may have an "off-the-shelf" product that will meet the needs of the particular supplemental training objectives.  Many of these "off-the-shelf" training products are web-based, accessible anytime and anywhere.  ***In any case, an important aspect of an effective TMS is the flight department's active engagement with their training provider(s).***

Another important resource available to business aviation flight departments is the regional business aviation groups around the country. These regional business aviation groups often provide training events that target industry threats. Operators should take advantage of the excellent training opportunities available within these regional groups.

One very important point to keep in mind while developing the training is to uphold the "KISS" principle of simplicity.  Training does not necessarily need to be complex. Generally speaking, the higher the complexity of a given training plan, the more difficult it will be to develop the actual training. Keep in mind, *effective* training is not necessarily directly proportional to the complexity of the training; in most cases, the more simple the training plan, the more effective the training.

## ELEMENT 3 = TRAINING IMPLEMENTATION AND DOCUMENTATION

It is important that the trainees understand the purpose and the desired outcome of the particular training event they are about to receive. Therefore, all training events should be implemented beginning with an explanation of the purpose of the training event and the desired outcomes.

A training plan is given the best opportunity for success by being shared with all the stakeholders ahead of time. Provide some type of pre-study material to allow the trainees to be "well primed" for the actual training. The training plan should be implemented in such a way that allows a seamless process of feedback to verify the effectiveness of the training received. *Training plan effectiveness* is addressed in the next element.

As the training is received, the training records must be updated to accurately document this process.

## ELEMENT 4 = TRAINING PLAN EFFECTIVENESS

Flight departments should develop a process to determine the effectiveness of the training delivered. Develop metrics to measure the effectiveness of the training. The type and level of sophistication of metrics will be based on the resources available to your flight department.

One method of determining the effectiveness of the training plan is to ask the trainees to submit a critique of the training they received. Open, honest feedback from the trainees is crucial information that a flight department can use to determine the effectiveness of the training received.

FOQA/FDM data, ASAP and/or ASRS reports, written tests, orals, line checks, and internal reports are other examples of tools available to measure the effectiveness of the training received.

Safety meetings are another way to determine the effectiveness of the training. The safety meeting agenda should have time scheduled to discuss the training plan and its effectiveness. A collaborative approach works for not only the development of the training, but also for understanding the effectiveness of the training as well.

## ELEMENT 5 = TRAINING PLAN MODIFICATIONS (if necessary)

Modify the training plan if necessary. Decisions to modify the training plan are based on the effectiveness of the training. Training plans will also need to be modified as circumstances within a flight department change (new aircraft, new equipment, new destinations, etc.). The TMS is a living document, and only remains a valid, useful tool if it is regularly updated.

If a training plan has been deemed ineffective the next step is to return to element two, _training development/modification_, and continue the TMS process of _training implementation_, _measuring the effectiveness_ and developing further _modifications_, if necessary.

# *Chapter 4 – Using and Maturing Your Training Management System*

The effectiveness of a Training Management System depends on the level of involvement of the flight department personnel. A primary source for threat identification within a flight department is the front line personnel.  Threats specific to a flight department's operation must be identified in order to utilize the most appropriate training to mitigate the level of risk to those identified threats. One important concept to keep in mind is that "appropriate training" for one flight department could be very different from the "appropriate training" for another flight department. In other words, a TMS is most effective when the training accomplished is focused on the Safety Risk Profile developed by a flight department as part of its SMS. The training that is utilized must be the most appropriate and most effective for that flight department's needs and available resources.

Some organizations think only of their training provider whenever the subject of training is discussed as a tool to mitigate risk levels to certain identified threats. Training providers play a significant role in an effective TMS, however, the point should be made that flight departments have the potential to develop internal training events that can be used to address certain threats.

> Examples of potential training options available to flight departments: An article in an industry publication that addresses winter operations could be designated as "required reading" to mitigate the risk of winter operations within a flight department.

- Many training providers offer some type of computer based training on various subjects. This type of training could be designated as required viewing to mitigate the level of risk of certain threats identified within a flight department.

- An NTSB accident report could be designated as required reading if a flight department felt the accident report would serve to educate personnel and thereby mitigate the risk level of identified threats.

The examples above should get flight departments thinking of ways to incorporate effective training strategies to address the threats within their operation.

As with any new concept, a TMS matures as the organization finds new ways to utilize training to address certain identified threats.  An effective TMS, much like an effective SMS, will experience continuous improvement as organizations attain more experience using their TMS. A flight department with a positive safety culture will see their TMS

become more and more effective in mitigating the risk levels of the threats present in their operation.

## The Training Flow Diagram

The training flow diagram shown below, illustrates the steps of threat identification, training development, training implementation, and measuring the effectiveness of the training of all team members.
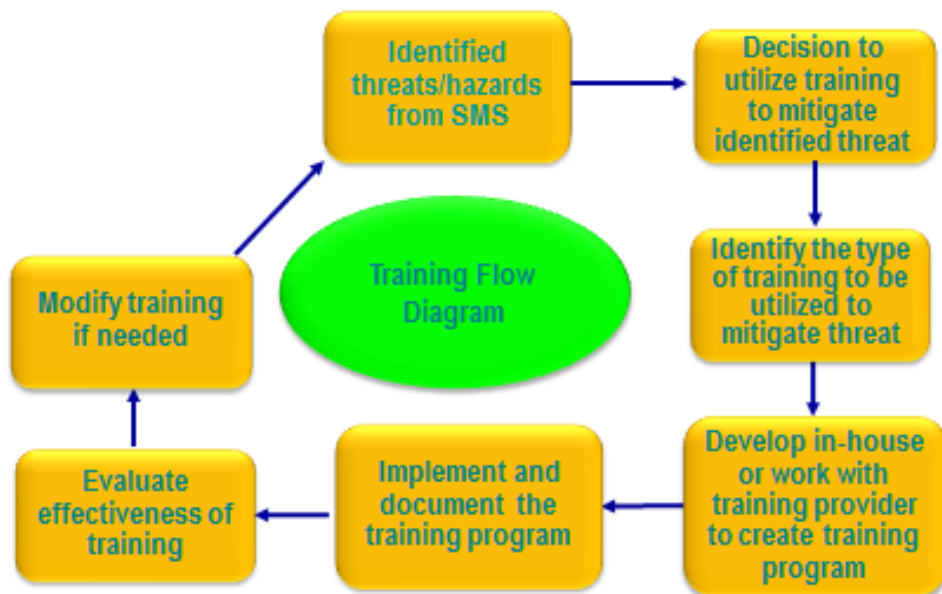
# *APPENDIX A: Links to helpful training resources and materials*

FAA     http://www.faa.gov/training_testing/training/

NBAA    http://www.nbaa.org/prodev/ondemand/

NASA    http://asrs.arc.nasa.gov/

ICAO    http://www.icao.int/Search/pages/results.aspx?k=training%20programs&s=All%20Sites

AOPA    http://www.aopa.org/Education.aspx

FSF     http://flightsafety.org/

IATA    http://www.iata.org/training/Pages/index.aspx


**Upset Recovery**
http://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/AP_UpsetRecovery_Book.pdf

**Physiology**
http://www.faa.gov/pilots/training/airman_education/media/IntroAviationPhys.pdf

http://www.faa.gov/pilots/training/airman_education/physiologyvideos/

**Takeoff Safety (Go-No Go Discussion)**
http://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/takeoff_safety.pdf

**CRM**
http://www.faa.gov/tv/?mediaId=447

http://www.skybrary.aero/index.php/Crew_Resource_Management

**Basic Survival**
http://www.faa.gov/pilots/training/airman_education/aircrewsurvivalvideos/

**PRM approaches**
http://www.faa.gov/training_testing/training/prm/

**FAA Online Resource List**
http://www.faa.gov/training_testing/training/ (Includes Mechanic Training)

http://www.faasafety.gov/gslac/onlineresources.aspx?masterId=1 (Requires registering with FAA.Safety)

**NBAA Education Offerings (Charge/course though some are free. Members enjoy additional resources)**
http://nbaa.peachnewmedia.com/store/provider/provider09.php

### Icing
http://aircrafticing.grc.nasa.gov/courses.html

### RNAV
http://www.icao.int/safety/pbn/Documentation/States/Japan_RNAV%20Training%20for%20ATC.pdf

### Wake Turbulence
http://www.faa.gov/training_testing/training/media/wake/01wake.pdf

### Go-Around Safety
http://www.skybrary.aero/index.php/Portal:Go-Around_Safety

### Fatigue Risk Management
http://www.skybrary.aero/index.php/Fatigue_Risk_Management_System_(FRMS)

### Employee Reporting (ASAP/ASRS)
http://proactivesafetyinc.com/services/sms-toolbox/employee-reporting/

### Airplane Upset Recovery
http://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/AP_UpsetRecovery_Book.pdf