Turbulence
Joint Safety Implementation Team

Detailed Implementation Plan
For
Implement Best Practices for Turbulence Avoidance

DRAFT

Statement of Work: Develop Government and air carrier policies and procedures that will minimize inadvertent turbulence encounters through the implementation of the "best practices" outlined in Advisory Circular (AC) 00-30. The model program defined in the AC for carriers calls for turbulence avoidance as the first line of defense, and it outlines a comprehensive program of acquisition and use of turbulence information plus comprehensive initial and recurrent meteorological training standards for aircrews, dispatchers, and meteorologists. This project, building upon the structure of the AC, identifies actions to be performed by both Government and the carriers to fulfill the intent of AC00-30.

The principal provisions of AC00-30b "Best Practices" are:

a. *Adopt the corporate philosophy of avoidance of turbulence as first line of defense.*
b. *Use all applicable weather data and products including alphanumeric weather information such as METARS, area forecasts and terminal area forecasts (TAFs), wind & temperature forecasts, NWS in-flight advisories (SIGMETS, Convective SIGMETS and AIRMETS), upper air charts, graphical radar summaries or composites, and satellite imagery.*
c. *Use sophisticated product generation to merge diverse sources into graphical products to track turbulence.*
d. *(1) Compile turbulence information, including PIREPs, and make it easily accessible to controllers and dispatchers.*
   (2) Ensure timely and accurate pilot reporting (PIREPs). [see Improve the Quality of Turbulence Information Project]
e. *Ensure efficient air-ground and ground-ground communication system for exchange of turbulence information to and between aircrew, dispatcher and meteorological support function.*
f. *Maintain dedicated and continuous training program for aircrews, dispatchers, meteorologists, and other operational control personnel.*

Lead Organization for Overall Project Coordination (LOOPC): Air Transport Association (ATA)

SE 64, 65

SAFETY ENHANCEMENT 64: Corporate culture of turbulence avoidance.

Score (InjuryRdx%):   2007: 0.13   2020: 0.18   Full: 0.18   '07 Imp: 75%

Total Resources Required:

	Government		Manufacturers		Operators		Total
	FTE	$M	FTE	$M	FTE	$M	FTE/$M
2007	8.0	2.9			9.5	3.7	17.5/6.6
2020	6.0	1.8			6.5	2.9	12.5/4.7
Totals	14.0	4.7			16	6.6	30/11.3

Completion Date: Completed 60 months after CAST approval of Safety Enhancement.

Output 1: Develop/implement corporate culture of turbulence avoidance.
        a. **Airlines**: Implement dispatch/flight operations policies prescribing re-routing around observed/forecast significant turbulence, and standard clearance between thunderstorms and aircraft.
        b. **Airlines/FAA**: Revise/amend airline safety programs and operations procedures accordingly.

Resources: ATA Cabin Operations Committee (LOOC), RAA, FAA.

Timeline: Completed 60 months after CAST approval of Safety Enhancement.

Actions:

- **Airlines** -- Adopt and implement dispatch and flight operations policies that prescribe re-routing around forecast/observed significant clear air turbulence. Prerequisite: Implementation of SE68, Improved Turbulence Forecast Accuracy.
- **Airlines** -- Revise flight operations manuals and flight crew training to reflect "industry standard" clearance between thunderstorms and aircraft. Prerequisite: Implementation of SE70, Standardize Vertical and Horizontal Clearance Distance from Thunderstorms.
- **FAA/Airlines** -- Revise/amend airline OpSpecs accordingly as new turbulence re-route and thunderstorm clearance policies are adopted.

Output 2: Develop/utilize graphical turbulence products.

Resources: FAA/AUA-400 (LOOC), FAA, ATA, RAA, NCAR, NWS, FSL

Timeline: Completed 60 months after CAST approval of Safety Enhancement.

Actions:

- **FAA Turbulence Product Development Team (PDT)** -- Accelerate development and deployment of automated, graphical forecast products (such as are produced by the Integrated Turbulence Forecast Algorithm (ITFA)). Disseminate these new graphical products that synthesize observations, forecasts, nowcasts, and model output to all airlines.
- **FAA/NCAR/FSL/NWS/Airlines** -- Define and develop next generation ground display concept that integrates in situ turbulence reports, PIREPs, and synthesized turbulence forecast graphics such as ITFA.
- **FAA Turbulence PDT/NWS/FSL** -- Develop a plan for the operational implementation of a four-dimensional turbulence forecast product that assimilates objective EDR data.

Output 3: Develop and implement standards for turbulence communications procedures and training in support of airline aircrews, dispatchers, and meteorologists.

Resources: ATA Cabin Operations Committee (LOOC), FAA, RAA, commercial weather vendors

Timeline: Completed 36 months after CAST approval of Safety Enhancement.

Actions:

- **ATA** -- Survey industry training programs with respect to "best practice" standards.
- **ATA/FAA** -- Develop minimum turbulence training standards.
- **FAA** -- Update the guidance in current FAA Order 8400.10, Chapter 2 (Airman Training Programs, paragraphs 379/439) and Chapter 5 (Dispatcher Training Requirements, paragraphs 1093/1121) to help ensure airline training programs meet new industry standard.
- **Airlines** -- Develop and implement training programs in accordance with the provisions of FAA Order 8400.10.

Performance Goals & Indicators for Safety Enhancement/Outputs:

- **Goal, Output 1:** All participating airlines to adopt new clear air turbulence and thunderstorm avoidance operating policies.
  - **Indicator, Output 1:** ATA will survey airlines at 12-month intervals to determine level of implementation.

- **Goal, Output 2:** Improved situational awareness for pilots, controllers, and dispatchers.
  - **Indicator, Output 2:** Availability of an integrated, graphical, operational government/industry turbulence product.
- **Goal, Output 3:** Comprehensive turbulence training programs instituted at all participating airlines.
  - **Indicator, Output 3:** Improved operational decision-making by pilots, dispatchers, and meteorologists, and a corresponding reduction in the number of turbulence injuries.

SAFETY ENHANCEMENT 65: Upgrade airline/Government collection and distribution of turbulence information.

Score (InjuryRdx%):   2007: 0.02   2020: 0.05   Full: 0.05   '07 Imp: 40%

Total Resources Required:

	Government		Manufacturers		Operators		Total
	FTE	$M	FTE	$M	FTE	$M	FTE/$M
2007	4.000	1.300			4.500	1.800	8.5/3.1
2020	1.250	0.550			4.250	1.750	5.5/2.3
Totals	5.250	1.850			8.750	3.550	14.0/5.4

Completion Date: Completed 60 months after CAST approval of Safety Enhancement.

Output 1: Upgrade Government and airline ground-to-ground and ground-to-air communications systems for turbulence information.

Resources: ATA/Cabin Operations Committee (LOOC), FAA, NWS, RAA, ARINC, Commercial Weather Vendors

Timeline: Completed 60 months after CAST approval of Safety Enhancement.

Actions:

- **Airlines/FAA/NWS/ARINC** -- Conduct system-wide assessment of communications/distribution system for gridded, alphanumeric, and graphical image turbulence information exchange in the National Airspace System (NAS) and develop a plan for needed upgrades in ground-to-ground and ground-to-air systems.

- **Airlines/FAA/NWS** -- Implement the upgrade plan through a cost-effective mix of Internet, Intranet and other evolving communications systems.
- **Airlines/Vendors/FAA** -- Develop a tailored "forced" uplink of critical alpha/numeric reports and forecasts to existing displays on the flight deck, and follow up with a comparable graphic product to take advantage of evolving flight deck display technology.

Output 2: Develop standards, based on airline "best practices", for utilization of turbulence information in airline flight planning systems.

Resources: ATA Meteorology Committee (LOOC), FAA, NWS, RAA, ARINC, commercial weather vendors

Timeline: Completed 36 months after CAST approval of Safety Enhancement.

Actions:

- **ATA/Airlines** -- Identify airline "best practices" for operational utilization of turbulence information in airline flight management systems.
- **ATA/Airlines** -- Develop design standards for operational utilization of turbulence information in airline flight management systems based on these "best practices".
- **Airlines** -- Implement design standards during routine upgrades and/or replacement of airline flight planning systems.

Performance Goals & Indicators for Safety Enhancement/Outputs:

- **Goal, Output 1:** Government and industry to develop systems to improve volume, timeliness, and distribution of turbulence information.
  - **Indicator, Output 1:** Timely and complete distribution of turbulence information to dispatchers, pilots, controllers, and meteorologists.
- **Goal, Output 2:** All participating airlines to adopt communications systems that improve in-house collection and distribution of turbulence data.
  - **Indicator, Output 2:** Increased volume of turbulence reports and information being relayed to dispatchers and crews.

Relationship to Current Aviation Community Initiatives

- AC00-30 is in effect, and addresses:
  - An appropriate initial and recurrent training program,
  - A dedicated planning/dispatch function, and

- A fully supported operational implementation of a pilot reporting (PIREP)/communications system (not ATC-based).
- The one airline using the "best practices" of AC00-30 has historically shown a lower turbulence accident rate than the industry as a whole. Less than 1% of the turbulence accidents studied by the JSAT were attributed to that airline.
- Training programs vary widely among the airlines.

Programmatic Approach

Organizational Strategy

The FAA Act of 1958 established the inherent obligation of any air carrier certificate holder to maintain the highest level of safety in the public interest. Besides its regulatory and enforcement functions, the FAA has developed many voluntary programs for the promotion of safety culture from within an air carrier corporation. It is incumbent on the air carriers and their employee groups to embrace these voluntary programs and to implement them as effectively as possible. The CEO and the Director of Safety are the principal advocates of safety culture within the corporation, without whose efforts an effective safety program fails. Collaboration between managers and non-manager employees is absolutely essential.

The Lead Organization for Overall Project Coordination (LOOPC) is ATA, a member of the CAST. ATA will coordinate industry implementation of the best practices of AC00-30b, including a program to improve the dissemination and use of turbulence information. The Lead Organizations for Output Coordination (LOOC) are identified in each Output of this Implementation Plan. Included are ATA and FAA organizations with responsibilities for oversight. The roles and responsibilities of the LOOPC and LOOC are described in the CAST approved JSIT Process Document.

Implementation Activities

The ATA Flight Operations Committee will assume oversight of this project with an ATA/FAA working group to coordinate and ensure implementation.

Key Products and Milestones

Safety Enhancement 64: Develop/implement corporate culture of turbulence avoidance.
Output 1: Develop/implement corporate culture of turbulence avoidance:
a. Implement dispatch/flight operations policies prescribing rerouting around observed/forecast significant turbulence, and standard clearance between thunderstorms and aircraft.

b. Revise/amend airline safety programs and operations procedures accordingly.		

Action	Responsible Party	Completion Date
Adopt and implement dispatch and flight operations policies that prescribe re-routing around forecast/observed significant clear air turbulence. Prerequisite: Implementation of SE68, Improved Turbulence Forecast Accuracy.	**Airlines**	**60 months from CAST approval**
Revise flight operations manuals and flight crew training to reflect "industry standard" clearance between thunderstorms and aircraft. Prerequisite: Implementation of SE70, Standardize Vertical and Horizontal Clearance distance from Thunderstorms.	**Airlines**	**36 months from CAST approval**
Revise/amend airline OpSpecs accordingly as new turbulence re-route and thunderstorm clearance policies are adopted. .	**Airlines/FAA**	**60 months from CAST approval**

Output 2: Develop/utilize graphical turbulence products		
Action	Responsible Party	Completion Date
Accelerate development and deployment of automated, graphical forecast products (such as are produced by the Integrated Turbulence Forecast Algorithm (ITFA)). Dessiminate these graphical products that synthesize observations, forecasts, nowcasts, and model output to all airlines.	**FAA Turbulence Product Development Team (PDT)**	**24 months after CAST approval**
Define and develop next generation ground display concept that integrates in situ turbulence reports, PIREPs, and synthesized turbulence forecast graphics such as ITFA	**FAA/Airlines/ NCAR/FSL/NWS**	**60 months after CAST approval**
Develop a plan for the operational implementation of a four-dimensional turbulence forecast product that assimilates objective EDR data.	**FAA Turbulence PDT/NWS/FSL**	**36 months after CAST approval**

Output 3: Develop and implement standards for turbulence communications procedures and training in support of airline aircrews, dispatchers, and meteorologists.		
Action	**Responsible Party**	**Completion Date**
Survey industry training programs with respect to "best practice" standards.	**ATA**	**12 months after CAST approval**
Develop minimum turbulence training standards.	**ATA/FAA**	**36 months after CAST approval**
Update the guidance in current FAA Order 8400.10, Chapter 2 (Airman Training Programs, paragraphs 1093/1121) and Chapter 5 (Dispatcher Training Requirements, paragraphs 1093/1121) to help ensure airline training programs meet new industry standard..	**FAA**	**36 months after CAST approval**
Develop and implement training programs in accordance with the provisions of FAA Order 8400.10.	**Airlines**	**36 months after CAST approval**

Safety Enhancement 65: Upgrade airline/Government collection and distribution of turbulence information.
Output 1: Upgrade Government and airline ground-to-ground and ground-to-air communications systems for turbulence information.

Action	Responsible Party	Completion Date
Conduct system-wide assessment of communications/distribution system for gridded, alphanumeric, and graphical image turbulence information exchange in the National Airspace System (NAS) and develop a plan for needed upgrades in ground-to-ground and ground-to-air systems.	**Airlines/FAA/ NWS/ARINC**	**12months after CAST approval**
Implement the upgrade plan through a cost-effective mix of Internet, Intranet and other evolving communications systems.	**FAA/Airlines/ NWS**	**36 months after CAST approval**
Develop a tailored "forced" cockpit uplink of critical alpha/numeric reports and forecasts to existing displays on the flight deck, and follow up with a comparable graphic product to take advantage of evolving flight deck display technology.	**Airlines/ Vendors, FAA**	**60 months after CAST approval**

Output 2: Develop standards, based on airline "best practices", for utilization of turbulence information in airline flight planning systems.

Action	Responsible Party	Completion Date
Identify airline "best practices" for operational utilization of turbulence information in airline flight management systems.	**ATA/Airlines**	**12 months after CAST approval**
Develop design standards for operational utilization of turbulence information in airline flight management systems based on these "best practices".	**ATA/Airlines**	**24 months after CAST approval**
Implement design standards during routine upgrades and/or replacement of airline flight planning systems.	**Airlines**	**36 months after CAST approval**

Risk Description and Risk Mitigation Plan

RISK DESCRIPTION	RISK MITIGATION PLAN
R1 – changing corporate culture will be difficult and ATA may not be able to insure full compliance with the standards developed.	M1 - Insure corporate buy-in of plan

Impact on Non-FAR Part 121 or International Applications

Implementation of this project will be independent of ICAO Standards and Recommended Practices (SARPS) but will likely lead foreign carriers to follow suit. Training programs could be made available to international carriers and general aviation.