



**TEXT of Presentation given to CGAR/ERAU GA-FDM Conference on 8\_19\_09 (Blue text reference slide bullets)**

**WELCOME Slide:**

**Welcome. Thanks to Dr. Brady, ERAU, CGAR and the FAA for making this conference a reality. As we work our way through this presentation, I ask each of you to consider the C.A.P. in CAPACG – What does it mean?**

**In the first Flight Data Monitoring workshop in January 2007, we spoke of the confluence of Safety Management Systems and affordable FDM technologies coming together. We stated this “confluence” was a watershed in Aviation history and an opportunity to truly reach one level of safety. We believe this still today.**

**The Safety Management System offers a Global template, a common language of Safety attributes and best practices. The FDM technologies, the analysis and its dissemination and sharing are an integral part of supporting an efficient SMS**

**Today, Larry McCarroll, Kipp Lau and I are going to cover the following Seven Topics (read from PPT) that will address much of what the panel charge was for our team.**

**1 FDM for GA - The Evolution & Proof of Concept Programs - The Goal in the next several bullets is to share with you a few of our experiences with GA-Flight Data Monitoring. One of the potential outcomes from this conference will be to expand on these experiences and providing FDM systems to a broader spectrum of General Aviation.**

**1.1 2004 -**

**1.1.1 FDM R and D --CAPACG incorporated and our mission was outlined to explore the viability of migrating airline style safety programs to General Aviation, with FDM falling under that umbrella.**



## 1.2 2005

**1.2.1 Plausibility of FDM in GA- Intro at NTAS - Presented Flight Data Monitoring Concepts at the National Aircraft Training Symposium to gauge the reaction from participants – the reaction was extremely positive. Armed with this feedback, our team moved forward to create relationships with hardware manufacturers to develop low cost FDM solutions for General Aviation.**

## 1.3 2006

**1.3.1 GA Technologies Emerge (Legacy)- Cal Fire Trial - This was a proof of concept trial with the California Department of Forestry to test the viability of using the Appareo GAU 1000 and the UHL system, to gather data in from “steam gauge” aircraft. At the conclusion of this trial, a report was published and RFP was issued by the State of California and awarded to Appareo Systems. This provided the acceptance of FDM in GA we needed to move forward.**

### 1.3.2 (S2 Tanker)

## 1.4 2007

**1.4.1 First ERAU CAPACG FDM Workshop – Invited FAA, NTSB Industry and Academia to chime in on what attributes a GA FDM system might have – we coined the term Plug and Play FDM. Deliverables from this workshop included; the development of a GA-FDM White Paper – you can find it on the on-line reference section of the CAPACG website, formation of a ad-hoc FDM steering committee and the search for funding for a large FDM research project.**

**1.4.2 SATSair Trial (TAA), this unsubsidized demo involved Five SR-22 aircraft using the Alakai Digital Flight Data System. Many lessons were learned during this trial, one important lesson was the need for wireless transmission of data to limit data latency. The benefits of this are a more immediate feedback into your continuous improvement loop. Additionally, the trial furthered our conviction that FDM can be used effectively as The Silent Mentor, in the single pilot operation or training environment.**



### 1.4.3 FDM... The Silent Mentor -

**1.4.4 Air Safety Flight Academy** - this trial involved capturing data utilizing the port on the Avidyne Entegra Primary Flight Display with a USB memory stick. We captured some significantly valuable information, however at times due to the inability to get the data uploaded to the server, it was dated and we couldn't provide the necessary timely feedback. Also, in some cases, the sampling rate was insufficient to have valid FOQA events.

### 1.4.5

**1.4.6 Air Logistics - FAA Approved FOQA Program** - Significant because this was the First Approved FOQA program where the operator was collecting FOQA data with a light recorder.

**1.4.7 Indigo Flyers (1 aircraft) - self managed program** - Further validation of FDM systems for small operators- Indigo continues to utilize FDM and their trends indicate continuous improvement. One example would be the reduction of high-speed taxi events for their operation. Pilots aren't rushing.

**1.4.8 SATSair - 3rd party program** - The SATSair program was deployed on several SR-22's using the GA-FDM System. This and Indigo were the test platforms for embedded analysis. What this means, is that the DATA that comes off the aircraft is processed DATA and No Ground Analysis Station is necessary. This is significant because it provides instant feedback to maintenance, operations, Safety Officers, training and also provides information on Efficiencies or Economics.

**1.4.9 Cirrus Design - DFDS Trial** - They deployed 3 recorders - again, data latency was an issue, but as data came in, it proved the importance of the education process involved in any FDM program. For Cirrus, our team spent a fair amount of time educating the pilots who would use the system. We had a limited data set, but most flights were textbook flights.

## 1.5 2009

**1.5.1 Arkansas Children's Hospital - 3rd party program** - This program is actively collecting data using the Appareo GAU 2000 and Alerts and ACH be submitting their Implementations and Operations Plan to the FAA for approval. In a moment we will review a case study from an autopilot excursion one of their pilots experienced.



## **1.5.2 GA -Flight Data Monitoring Conference – And this brings us to 2009**

### **2 So, why are we here?**

**2.1 ASIAS Roadmap -- AVIATION SAFETY INFORMATION ANALYSIS AND SHARING (ASIAS) SYSTEM**, the sponsors of this conference have seen the potential and the opportunity to harvest aviation data never before obtained or analysed. That's why we are here: to develop a sound infrastructure and effective information gathering and sharing for General Aviation, not just for the individual operator but for the aggregate and the global SMS.

**(Reference the roadmap on slide) – GA is to BIG, NOT to be part of this process and GA is to BIGG NOT to succeed in this process.**

**2.1.1 Develop Effective GA Data Gathering Methodologies,**

**2.1.2 Develop a Sound Infrastructure for GA Data Sharing**

**2.1.3 Not Just for the Individual Operator,**

**2.1.4 but for Aggregate and the Global SMS**



### **3 FDM Supporting a Sound Safety Culture**

**3.1 As you know ICAO states a Safety Management System has four pillars:**

**Safety Policy & Procedures**

**Safety Risk Monitoring**

**Safety Assurance**

**Safety Promotion**

**The objective data and analysis of Flight Data supports all the pillars of a Safety Management System by keeping the operator INFORMED, by REPORTING, allowing LEARNING and FLEXIBILITY to make required changes and monitor those changes.**

*Informed, Reporting, Learning, Flexibility*, are four of the five elements required in a sound safety culture according to James Reason. The remaining element, "To BE JUST", will have to be in place to assure the mutual trust between the "Reporters" and the Operators, thus promoting the free flow of "reporting" and monitoring of the SMS.

**With FDM the realized support of these pillars comes from the final product; the analysis, reports and the subsequent improvements.**

#### **3.1.1 FDM's Objective DATA**

#### **3.1.2 Keeps Operators Informed, by Reporting,**

#### **3.1.3 Allowing Learning & Flexibility to make and monitor change**

#### **3.1.4 The Remaining Element**



#### **4 DATA - Your Have to use it!**

**4.1 What happened? What is happening? What could happen? What are the controls, How do we improve?, Did the changes work?**

**FDM can be reactive, Proactive and Predictive when the data is analyzed, turned into information, and then into distributed knowledge. However, flight data is sort of like canned soup. (Condensed Campbell's soup, you had to open it, add water, you had to warm it, definitely season it) Data without analysis is just canned data. This soup has to be processed to become useful. You got to get it out of the can and into the system to have value, (nutritional or knowledge).**

**One of the newer FDM products here today does embedded FOQA analysis while on the aircraft and sends the information upon landing in readable text. I would put that closer to "heat and eat "category. However the ability to dice and slice data into useful knowledge is the goal and ultimately sharing in the aggregate is the destination**

**4.1.1 What Happened?**

**4.1.2 What is happening?**

**4.1.3 What Could Happen?**

**4.1.4 What are the Controls**

**4.1.5 How do we improve?**

**4.1.6 Did the Changes Work**



## 5 A Brief Comparison - GA Flight Data Monitoring compared to PART 121 FOQA

**<TALK TO THIS SLIDES first 3 Bullets>** and the brief as follows; General Aviation operators are extremely varied and unique. When thinking “varied and unique”, the analysts should think “hazard control” and “Risk Management”. A helicopter performing a platform landing, a solo student cross -country in a TAA, a charter flight to a mountain airport, the mission possibilities are unlimited however the opportunity for identifying hazards and seeking their controls are increased for the safety manager and their FDM analysts.

One consideration with General Aviation is the Frequency of Flights, where a Part 121 operator may have 1000s of flights a month the GA Operator may only have a handful – This creates a shift in the way we report and analyze data, but the findings can be equally as powerful. A GA Operator may have reports generated on a monthly, quarterly and in some cases, with wireless capabilities, get instant feed back with target e-mail reports.

Small operators are embracing FDM programs. As an example, ACH, which is a non-union pilot group uses a Memorandum of Understanding with their pilots. Each pilot, when hired, is FDM trained and agrees to participate in the program.

Additional differences can be found when we look at cost, technologies and weight. Currently retail pricing points are considerable less than traditional equipment. There are several venders here that can review systems capabilities and specifications.

We look forward to seeing the continued evolution of FDM investigative tools, both from the legacy companies and the new players in Flight Data Monitoring.

.

### 5.1.1 Types of Operations are Vastly Different

Part 121 – 100s of Airports

GA and PART 135 -- Over 5000 airports



Helicopter's can operate in an endless number of locations

121 Carrier may have 1000s of flights a month and the GA Operator a handful

*Can a small operator have a FDM Program?*

Union vs. Non-Union Pilot Group

*Cost of Equipment and Services*

*Embedded FOQA with Wireless Data Transmission*

Weight –

**NEXT SLIDE is the Movie (not attached to this presentation)**

**Take a moment and watch this clip – there was an autopilot excursion that caused an excessive yaw and then we will provide an overview of the case study that was generated as a result of this event.**

## **6 A Brief Review of a Case Study Created from Data using a GA Light Recorder System**

**We have worked as analyst with the legacy FDM processes; we have also worked with the newer technologies. In either form or process the key to the data analysis is the derived information and knowledge that will be disseminated to support the safety culture through the reports. The flight crew of a Sikorsky S-76C+ experienced two autopilot excursions in flight. Each excursion caused a minor in-flight upset. Through subjective pilot reports, the operator could not verify the severity of the event – in particular quantifying the amount of change in the yaw rate. Exceeding the flight manual limitations would create an AOG situation, negatively impacting the hospital's flight operation and causing an expensive inspection to return the aircraft to an airworthy status. Using objective flight data, CAPACG analysts were able to determine that there were no limitations exceeded and the aircraft was returned to service without impacting the normal flight schedule. This is an example that with proper analysis of how an effective FDM program produces improves E-MOST.**

### **6.1 2 Auto Pilot Excursions**



**6.2 Crew not sure if they exceeded Airframe Limitation**

**6.3 Data Confirmed they did not**

**6.4 No AOG**

**6.5 No Costly Inspections**

**6.6 No Lost Revenue**

**6.7 Improved ROI**

**6.8 Supports Safety Culture**

## **7 Closing**

**7.1 These are exciting times in GA, data can be harvested, information gleaned, knowledge disseminated by sharing analysis. This is the purpose of ASIAs and the essence of SMS. We have the will, we need to only utilize the tools given us and embrace and practice the Safety culture of continual vigilance and improvement thru Continual Aviation Proficiency utilizing Continual Auditing Programs within an effective SMS. "One Level of Safety, it's more than a slogan it's the right thing to do "**