

# INTEGRATED APPROACH TO FLIGHT CREW TRAINING

## AT UNITED AIRLINES

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CAPT. CARROLL: Thank you, John. A couple of things before I get started. One, John did ask me to cover more of a subject than just cockpit resource management. As a result of the previous presentations, I'm having a baby waiting to get to that part of my presentation, because I'd like to address some of the things that they have already covered and to demonstrate that we probably all have a slightly different outlook on some things.

First I am going to take a look at training in general and try and give you some recognition or perspective that perhaps you can use in concert with what you already have. Some of what I'll say I think you'll probably find you can adopt or adapt depending upon your resources and the people with whom you might get together to do that. Again what I guess I am saying is cooperate in getting to your training goals instead of each of you trying to invent the wheel each time.

So as I go through this, the first part of this is a commercial, because we show our training center. But as Paul Caro said this morning, training centers or training tools do not teach. Now, we house everything there in the training center. We have a mission that we have been assigned at the training center to do our training safely, efficiently and legally and to apply some quality control. That's been our approach for quite sometime.

In applying all of the types of training, we try to take an approach that the training should be based upon the same objectives and criteria. That means that you should have a consistent approach in what you do with your people so that when they go from airplane to airplane or seat to seat, the transition for them is facilitated by the fact that the training method is essentially the same.

Our approach as far as training is concerned is to base things primarily on what we call the SAFOT document or a Systems Approach to Flight Operations Training. SBOs is another way of looking at it. At the same time try and take advantage of all the technology in achieving our objectives.

So when we look at our overall training analysis, we do start off with what the objective is for that particular course. We determine what the criteria will be to measure the achievement of those objectives. We decide on the procedures, software and hardware that will be used in the program. We assess the personnel requirements that are contingent upon that assessment. We determine whether the criteria that we had established can be used in other ways from the standpoint of the fallout of the information we get; are they achieving their purpose? And then we have a training and/or evaluation proposal that we will submit at the end of the training.

Basically, to use a phrase that has been used earlier today, we try to approach our training on a need to know rather than a nice to know basis. Paul referred to that this morning. We have had some questions, as he said, about whether the content of our training has been as good as it should have been. Did we have enough nuts and bolts information in there? Jim says his airline is a nuts and bolts airline.

Well, as Paul indicated, we've determined that the content of our training really is enough for the flight crew members to operate from their crew positions. We use the phrase that we "teach from the cockpit out rather than from the system in." What can the pilot do about what is presented to him; how can he address what comes to his attention, rather than get back into the background that so many of us had initially about learning all about generators and electric circuits and Wheatstone bridges, and so on, and what value was that to us or is that to us today? It leads us to something I'll express later on, and that is we're trying to train our people to be more managers today than we are, if you will, stick and rudder men or women.

From the standpoint of what we have developed, I'm not going to go into a lot of detail on equipment or simulators. You know all about them. You know their uses. You know how effective they can be. I'll make a comment or two relative to them. They will do what you want them to do, but you must determine what it is you think you need to have done.

The FAA in their considered wisdom, I think, have put very heavy requirements on the industry from the standpoint of what simulation should achieve. And I think it's safe to say that after some consideration they have backed off a little bit from the stringent demands they made in recognition of actually what is taking place and what we need to know.

If I can use an expression I've used before, too many times in the past when we've tried to assess any training

tool, and I think the simulator is the best example of it, we have said in the case of the simulator it must duplicate the airplane. I think even that phrase was covered a little bit this morning by Paul. I think it's safer to look at it and say you want to replicate the airplane. By duplicating it means you'd have to get that damn thing off the ground, and if you did you wouldn't use a simulator, you'd use an airplane.

So from the standpoint of use of simulators: we have zero aircraft time training in all of our fleets at United now, and we had the first Phase 3, 727 simulator -- Ed Fell was there with the team just before I retired. They are very effective. The simulators do the job.

But some of the things I think that we also should consider, as has been expressed, is part task trainers and so on. When we got into a bind during some years in the late '70s as far as the demands on our training center facilities were concerned, we found we didn't have enough 727 simulator time available for the demands of the company and the crews we had to check out. So we constructed an advanced paper trainer that enabled us to go through a couple of the early periods in the simulator, and found that the transfer of knowledge from this "simulated simulator" was very effective.

It led us to recognize later on that you do not have to go first class in every case in order to get the information across to your people, to find that effective transfer is there. If we can go from zero airplane time in the simulator training program, with the LOFT following the rating ride, then I think we have proved that we can get out in the world and do things with less than the top of the line trainer, which in the past had been the airplane.

We also recognized that success on the airline starts with the selection process. In the past what we have done as an industry is hire people, put them in the cockpit of an airplane and really say from that point on "you can handle anything." We decided that as a result of what we used as an assessment tool, that regardless of what we do to the airplane, how we advance the technology, how we change the size of the crew, the complexity of the traffic system, whatever, "you can cope." I think that's fallacious reasoning.

As a result, as we got into our last new hire wave in the late 70's, we did a little bit of analysis of what we thought should be considered as far as selection was concerned. We were also influenced by the fact that we had an EEOC decree which caused us to advertise the fact that we were looking for cockpit crew members and the requirements were for a total of 350 hours and a high school education.

Well, from the standpoint of what the entry level was going to be for our training, it was evident it was going to vary quite a bit, because we had B-52 aircraft commanders coming out of the service, and we had people coming in who wanted to come under those minimum guidelines that we had. So we decided that we would try and take a slightly different approach and consider these points.

One of the points we considered was that probably classroom use was going to be inefficient with this broad background of the people that we had. So the training that we went into in the new hire program became criterion referenced. It was individualized and computer based. And from the standpoint of our assessment, I think it's valid for almost anyone that if you can take the people you have and take advantage of what they have learned in the past, then you are going to be able to effectively show that you've taken advantage of things without having to, if you will, give it to them over again, waste their time.

If we had given the same type of training in the new hire program and put everybody down into one classroom, and they had that broad gamut of exposure that I mentioned before from a 350 hour high school graduate to a B-52 commander who had his own big airplane for a long time and

flown thousands of hours, we'd be over the heads of some and putting others to sleep.

So, as a result, we decided we would go to a computer based training approach primarily to keep the student records; it gave us test scores; it showed us how they were progressing, whether they had to repeat. And we also had as a supportive recognition that they could use the conventional ways of training, which were the slide tapes, the video tapes and manuals that they could go to in case they had problems taking their 20 some tests and courses on the Plato system.

The results of our approach in this regard I thought were rather dramatic. Initially, we scheduled a four-week training course for new hire personnel. In the past we had used three to four weeks and seven instructors. When we went to the approach that I outlined, we came down to an average of nine days to complete and no instructors involved except on what we call a learning center basis where they could call for assistance if they felt that they needed some amplification of what they were doing. In reality, many of them finished in four or five days, but we kept it at two weeks.

This shows the advantages of technology as it can be used depending upon your work load and what your responsibility is to fulfill the mission your company has given you.

Some of the advantages, I think, from the standpoint of going to this approach of computer-based training -- and again I think you can centralize something like this with your people at some one location to where you could come, perhaps, for this kind of thing and minimize manpower demands -- pass exactly the same questions with a correct response. There was no longer any question, as when they sat in the classroom, whether they had all gotten the information.

We had an ability to collect all the data. We were able to change the course material just through programming. Obvious cost saving came into effect. The trainees accepted it very well, and the FAA also gave their approval.

One of the things again that I think enhanced this was that rather than just being in a passive mode of what I call a "pray and spray approach", where you sit them all down in the classroom and spray them with the information and pray that it takes, they now got immediate feedback about whether they knew what it was they were supposed to know.

Touch screen is an example of the response that Paul

pursued this morning and one of the enhancements that we had. They got immediate reaction when they were doing something, rather than just trying to visualize or verbalize what they were doing.

As a result of this experience and recognition that we had, we applied it then subsequently to our initial first officer and initial captain courses, with essentially the same kind of results. From the standpoint of initial first officers, people going from second officer to first officer for the first time, we had these results of ten days coming down to five and two instructors coming down to zero for the same reasons I enumerated before. And from the standpoint of initial captain results, from five down to three days and the instructors again from two down to zero. So there were obvious economic advantages, but there were also learning advantages that we found in using a different approach.

The ultimate in what we have arrived at in taking this approach is in the 767 program. We determined as a result of our experience that we would again use the criterion referenced approach. We'd also stay with the individualized approach and again it would be computer based.

This is what we did at the ground school. We used random access slides, audio, micro-Plato and a stand alone Plato. It turned out to be a multimedia program. The SPT, standing for Systems Procedures Trainer, which is an advancement of the Cockpit Procedures Trainer, based on Plato with the random access slides and tapes, the video tapes and manuals and hands-on training if they had to resort to that when they had a problem.

The overall reason for expressing this is that individualized training, I think, provides a much better product at a much lower cost. There is a much better transfer of learning, because you don't have people sitting in a group worried about asking the dumb question. When they do it in an individualized way they find much better assimilation of the information.

The Systems Procedures Trainer has a Plato terminal, and an AV and video projection system. They have backlighted panels so that when they get to the particular part of the cockpit they are talking about, it lights up automatically. They have their own little cubicle. They have their own disks, and they can proceed at their own pace. When they get through with the individualized training, they inform scheduling, and they get put into the simulator phase.

In designing our B-767 program, we used lessons that we had learned when we put Omega and the DC-10 computations all on the computer. The flight management system was used in

conjunction with the Plato system. What we learned in using the DC-10 flight guidance system is that when people went through an airplane with an entirely new concept -- and the flight guidance system in the 10 was new to us at the time -- it usually was a hang-up point in going through the training. It caused a lot of problems.

So when we got to the 767 and the recognition they now were becoming computer operators and programmers, we decided we'd try to give them an opportunity to train before they got into the expensive full-time training vehicle, the simulator, to become acclimated and adept at punching in the CDU what it is they had to do.

Now let me get into what is a concern that has been addressed earlier this afternoon. With all of the advances we've made, with all of the technology that has been improved, with all of the money we have spent on advanced simulation with the selection process that we've gone through -- we still have accidents.

We mentioned earlier this morning and this afternoon why we address the cockpit resource management area.

We on United had three accidents all in the month of December in the years of '72, '77 and '78. So we decided we had to address a problem.

Let me run through a list of accidents that I've taken from our cockpit resource management program material just to have you recognize the universality of what I'm talking about. The problem is not peculiar to one airline. It is not peculiar to the size of the airline. It's not peculiar to the equipment or the geographic location.

I'm not going to make comments on each of these accidents. It is not my intent to castigate any one particular airline. I've already confessed to three of our own. You'll see eight more from eight different airlines, and I think you are familiar with most of these. They all come down to exactly the same thing, improper use of the resources available to the captain either within or outside the cockpit. Some of these as I say you may be more familiar with than others depending upon your background.

This accident involved an extraneous conversation about an amusement park and busting altitudes going past the final fix too fast, etc. This one I think you are familiar with in the Washington area when they came down to an altitude that was below what they should have been at the time for the distance they were from the airport. The second officer turned off the ground proximity warning, and they hit the water.

This was alluded to before about getting even, by Hugh. If the captain comes on too strong and he suppresses his co-pilot, the co-pilot may not hold a grudge, but he's going to get even. This was a case of the co-pilot getting even, I think, from what we are able to determine. And as a result, he got killed getting even. They lined up with the wrong runway, but he withholds the information from the standpoint of really not coming on very strongly with it, in an assertive manner, if you will.

This one is a DC-10 programmed to climb out on a flight guidance system at a rate climb out. They started to get a burble on the climb out. They think it's one of the engines, and they throttled back. The airplane falls off on the wing and loses many thousands of feet. They pull out, and they proceed on to Mexico City. When they get there they find that they are missing four feet of their horizontal stabilizer from each side. The burble was a stall because they climbed out on a rate, and they were getting to an altitude where they couldn't maintain the rate, and they stalled out.

You are familiar with this one? No comment perhaps in this regard is necessary. But all of these for us, and I think for all of you who have approached cockpit resource management, raised a particular question. Simply stated: Why?

In running through another series that I'll just let you read, I think you'll recognize the approach that we've taken, and then I'll discuss our program just a little.

When we had the history that we did, and we investigated the same statistics that have been reviewed in part today, we discovered that 60 percent of all accidents between 1970 and 1980 in the commercial industry had as a cause, or one of the causes, improper management of the resources available to the cockpit.

What we had been doing paralleled a little of what you heard in part today. We were giving what we call an executive offices seminar to all of our new captains. That was to do what had been outlined here today in part, and that was to educate them on the company, how to work with other departments, the responsibilities of the other departments. It lasted five days. But when we investigated after finding out the need for this training, we also discovered that around the world most people were doing essentially what we had done in the past.

There were several things that stood out for us like sore thumbs.

First of all the accidents that we reviewed were a result of too few questions being asked by the crew, individually and collectively; too little information being exchanged; conflicts not being resolved during emergencies, conflicts from the standpoint of a difference of opinion or reactions that they were getting from their equipment which were different than what they thought they should get, because of the actions that they had taken.

When we looked at all that and looked at all the programs, we found that most people were training only one person in the cockpit, and in the main the captain, and again, mostly new captains. Secondly, they only did it once. And again to use the same phrase I used before, we thought that was a spray and pray approach. You don't keep your handicap down playing golf, you don't keep your tennis game sharp, you don't keep anything going efficiently unless you do it consistently. So we found those two to be rather common ingredients.

Also a third aspect was that most of the programs were relatively passive; they were not participative courses. The individuals again were told what to look for, told what to consider, told what perhaps in a teach or tell way was the way in which they might react or consider reactions. But they never were really able to discern for themselves and internalize what we thought was necessary.

After the '79 seminar that was referred to earlier, we went into action. From February of '79 until June of '79 we had just the management group together, and we really didn't know which way to head. We didn't know whether we should teach command. We didn't know whether we should teach leadership or whether we should pursue resource management. We ultimately decided on the latter, resource management. Command, leadership and resource management were the original considerations and is how we came up with the acronym CLR for the company. In our commercial application of it we called it CRM for cockpit resource management.

At any rate, when we made these decisions as to which way we would go, we felt that we had to have a participative course so that people would be able to have an adult learning experience that was self-convincing. Pilots, if anything, become very resistant at being told what they should do, when they should do it and how they should do it if it is not procedurally oriented. If you try to get inside of their heads, they become very resistant.

We, too, got our population on board. After the first five months when we decided finally where we would like to head, we brought ALPA in in every working group, every committee we had including the steering committee. And that

proved beneficial. We also got their participation in all parts of the program when we put it into effect as a seminar.

Our first approach was to get the word out in a self-study way. Then we put all of our people through a seminar. And we started, apropos of what some other people said, with the top. Our senior vice-president of flight operations was in the first class. We trained all of our management and instructor personnel first. Then we trained all on a peer basis of captains, first officers and second officers.

We used line pilots as the instructors (only we called them administrators). No people from outside the company were used. We had two in each of the seminars. One was a representative of management and the other was the representative of the line. We felt that created credibility and got a lot of response from the crews, and it worked very effectively.

From the standpoint of participation, we had over 100 volunteers from the line pilots to do seminar training.

The seminar training is an opportunity after reading the self-study material to put into practice the things we told them academically and theoretically.

We clarify theory for them on the first day. The balance of the time it's totally operationally oriented just as the text is, although it is based on an academic theory, grid theory. And we allow them to recognize that it does apply in the operation of a cockpit.

Our results to date have been impressive to us but we have very little empirical evidence. I think Mike Yocum mentioned last night, the only way to measure the effectiveness of any course is with the next accident that you are not going to have. And you'll never know which one that was. So any advance you make in safety is really not going to have a bottom line measurement, from the standpoint of how many dollars you save and how much equipment you save.

What empirical evidence we do have is that after a year and a half of application of the whole program, where 4,586 people went through the training -- all of our cockpit crew members, because we feel they all have to be on the same frequency and understand what the premise is, not just one person in the cockpit knowing -- but after that number of people went through 202 total seminars, our failure rate came down by two-thirds. Now, that in itself is the only thing we can point to statistically.

From the standpoint of other results, we have feedback

from our flight standards instructors, the ones who conduct our LOFT exercise. We have a recurrent application in the LOFT in which we videotape the LOFT, play the film back, and they have a peer discussion on what took place. No evaluation, no records kept on what took place in that area. We'd have hell trying to take that away from them, but we had hell trying to get it put onto practice, because you know what the reaction of pilots happens to be to flight data recorders and cockpit voice recorders, and here we were going to put a camera in the simulator.

But we have reports from all of our flight instructors that say unequivocally that they see an improvement in the interaction of the crew members, a dramatic improvement. The cockpit environment created by the captains is one of openness, soliciting input from others, and that has caused a response from the first and second officers to make their contribution so that all of the information is available and a better decision can be made, and better problem solving as a result of all that interaction.

One of the things again that we addressed is the recognition that human factors is a buzzword subject right now. We look at the comfort of the seats. We even put lambswool in our 767 cockpit seats. You look at the lighting in the cockpit, the manuals, circadian rhythms, black hole effect. You tell them all about these things. But we feel that this particular approach to cockpit resource management enables our crew members to operate more efficiently in an imperfect human factors environment, because they work together. They get more information out of that collective working arrangement than they would from the standpoint of any one individual trying to be the authority in the cockpit.

One component of our seminar takes place in an interactive way using a team concept. Picture six people in one of our seminar teams pursuing some task that they have been given in the seminar. After the first day, it is all operationally based with the one exception when we review a film that is not aviation oriented but it is management style oriented. After this interaction, they end up giving feedback to each other on the third day. They are all peers. They never fly with each other again, probably. They have no threat. We don't keep any records.

We have two requirements: they attend and they participate. The union has agreed to that. It's a one-time experience in their career. They go through very long days, from 8:00 in the morning until 9:30 or 10:00 at night, but they have agreed to it. And the recurrent part of the program has started to show that the initial training was very valuable and is showing results as I mentioned before.

One of the things that we do in that LOFT feedback, as I mentioned to you, is that we show them portions of the videotape that the instructor who was present, just to be a communication interface, believes are germane to their learning experience. He may show them items which are a positive reinforcement. He may show them items that perhaps could have been done slightly better. And he'll start a minute or two before the area in which he thinks the discussion will be productive and then he just stays out of it. They watch it, then he turns it off and they discuss it among themselves as to why it went so well or where it could have been improved. If the conversation is not stimulative enough, he will ask a few questions but never judgmental questions. What do you think was taking place at this time? Who seemed to be making the decisions? Something like that, but no judgmental questions.

There was one other payoff that was never anticipated. We were the first ones to get the once-a-year training approval from the FAA, an exemption to do away with the twice-a-year visit. Our results, only coming back once a year now, have brought our statistical information down to the point where we have two-thirds fewer failures than we had before. The only thing we can attribute it to is the one change we've made.

The FAA said they were looking for four things in the way of training: crew concept training, LOFT, the advanced simulation, and human factors being addressed. When we had this course, we figured we'd have a go at it and ask for the exemption. We got it. It saved us 5,000 man days a year in training, and it had an economic payoff we had never anticipated.

From the standpoint of what we do in our recurrent training now, let me describe our three-day program. All of the requirements that the government lays on, all of the things that the company believes are germane to a good cockpit crew member and a team functioning together. They take some form of classroom training like systems review. It goes through the normal emergency evacuation procedures. They'll get scheduled specific instruction if it is deemed necessary by the instructors as a result of what they see in any part of the three days.

They go through over water ditching, if they are an over water crew. They go through the CLR LOFT exercise that I told you was videotaped in the simulator. They get an additional hour and a half after that LOFT exercise to go through the maneuvers that they will be confronted with on their check and perhaps weren't able to cover in the LOFT period. They have the proficiency check and oral on the third day.

And to prepare for all of this, they do prework in self-study material by bringing some of the completed examinations like the flight operations manual exam when they arrive at the center.

Emergency procedures and systems are exams that they have to take. They have available to them audio-visual material to review the systems before they come out and other self-study they might indulge in such as reviewing their manuals as far as approach procedures and so on is concerned.

We also make available flight safety videotapes. We think that's an inherent part of training to review known incidents and accidents. We go into our own primarily, but if there is one from the rest of the industry that we think is germane to our operation, then we review that as well.

For example, the 747 spool down. That's the one where we had three engines that didn't respond. The 767 low speed idle is the one in which both engines had to be shut down, and so on. Each one of those things educates the people in the field as a result of putting the tape in the domicile that they can be reviewed.

Overall, as a conclusion I would say that any program that you enter into should have consistency. I mentioned before the ease of going from one to the other. It should give you a promise of return, economic as well as proficiency in training. You should have some form of quality control in your training.

And from the standpoint of the cockpit resource management training, I have come to believe it's the cement that holds all the rest of it together. We can be just so good in our cognitive skills. We take it for granted that the psychomotor skills are there, that they are professional airmen, that they are healthy and mentally well-adjusted when they come to the cockpit. We don't delve into any of those areas, but we try to let them know that if they manage their operation better, if they work together better as a group, as a crew, they will get a much better result.

We are incorporating resource management training in our route checking, our initial operating experience as far as the check airmen are concerned in how they assess what's taking place. Our new hire/recallees are going through that kind of training. (It's an interesting combination to have over age 60 people in the same group with the new hire recallees whom they've been keeping out of the cockpit.)

It still seems to be very effective and taking very well. And we have an intention to go ahead with a variation

of the training in the initial first officer and captain training so that they will now learn new areas of responsibility as it involves cockpit resource management.

Whether you agree with our approach, Piedmont's, USAir's, or anybody else who has an approach in this area is not the question. We all would like to believe, because of the not invented here syndrome, that ours is the best program. But whatever you do, address the problem, because that's where our problems are today - resource management in the cockpit. Thank you.

DR. LAUBER: Thank you, Ed, for another outstanding presentation.

Could we have lights up, please? And open the floor for discussion questions. Jack enders has one over here.

MR. ENDERS: I'm Jack Enders. Flight Safety Foundation.

Ed, when you have the crew go through the over water ditching and the emergency evacuation training, do you integrate the cockpit and the cabin crew members together on that phase?

CAPT. CARROLL: Yes and no. We have combination classes in some of them but not in all of them. One of the things from the standpoint of integration of the cabin attendants or the flight attendants, as you mentioned, other people have indicated that they want -- Piedmont specifically -- to go after the flight attendants and get them involved in this kind of training. We believe it's an absolute necessity as well. We've got over 8,000 at this point, though, and to try and address a population of that size, the company has not found it feasible to get into it.

But we believe that it should be an integrated approach in every form of training because there is no question they are an integral part of the safety of the airplane when you get into those situations.

DR. LAUBER: Dick Norman and then Ed Fell.

CAPT. NORMAN: I have a comment and a question, too, Ed. I've been through your program partially, not being able to spend the entire time there. It's heartily recommended; it's very good. I'm trying to remember in my own mind, incapacitation training, is that given at that time or at some point of that period of time?

CAPT. CARROLL: We have built into our scenarios the incapacitation training to where one of the crew members will be told prior to the flight that at such and such a

point he is supposed to become incapacitated to see how the rest of the crew will then function. We've had the two-communication rule for a long, long time. We've had films on it that other people in the industry have used, which you are probably familiar with. But it is an integral part of the LOFT training, not a separate training vehicle.

MR. FELL: Ed Fell; FAA. Do you have several CLR training courses developed so that when a guy comes back for his next recurrent a year later he doesn't get the same course or something different, or how is that set up?

CAPT. CARROLL: That's a good question. Yes, we do change it yearly. No one goes through the same thing twice, either in the LOFT scenario or in the associated cockpit resource management information.

As an example, in the first year we used a film of an accident, which we use in the commercial version of this training, the Ketchikan accident. We asked the individuals the first day they were there, as a preparation for the next day when they are going to be involved in the simulator themselves, on a nonthreatening basis to assess what they believe was taking place in that particular cockpit. We filmed a re-creation of it in our cockpit, one of the 727 simulators. They get an exercise to assess that sort of thing. This year we've taken that out and substituted other materials which they respond to even more than they had to the Ketchikan.

One of the things I can say with confidence, that anyone who gets involved in one of these programs -- and I think I've heard the same thing from others -- the deeper you get into it the more you become committed to it, because you recognize the efficacy of what it is we are pursuing.

As I mentioned, we have a commercial version of this thing now. We had no intention of going commercial with it, but because of the questions we were asked, we've gone into it. We have run ten seminars commercially now. There are some people in this group who have attended some of those seminars. So far, the total has been 246 people that have gone through it.

We have an assessment, just as the other people have indicated, a critique of all of our training programs. Every time somebody finishes the training program they turn in a critique sheet and we try to learn from those critiques in all of the programs. We have a specific one for the cockpit resource management. On a scale of one to nine that we use the captains had rated it at 6.9, the first officers at 7, and the second officers at 7.1. In the ten commercial ones we've run, they've averaged out to 7.7 and have gone as high

as 8.7.

I think there is a reaction to the need for this kind of a program, and I think that again whatever you do, you address the program. Don't just figure it's going to go away, because we are all the same fraternity, have the same problems, and we all have to address it in some way to preclude having those problems continue.

DR. LAUBER: Other questions? Okay. Very good. Thank you, Ed.

Ed was concerned there was a bit too much overlap between the previous presentations and his own. To the extent that each of the programs that you heard discussed today share common elements, that's true. I think all of us saw some of the commonalities in the three programs, but we also noticed distinct differences.

I made the comment earlier today that I'm not so sure that there is one best way to approach the issues that we are trying to deal with, and that was one of the reasons that I was not concerned terribly about overlap in the three presentations, because there are different ways of approaching them. I think we are still learning how to use these techniques and what works and what doesn't. So I am encouraged to see the kind of diversity and at the same time the amount of commonality that is present in the programs that we've seen discussed today.

There was another reason for wanting Ed to expand his discussion beyond the CLR program. And that's to tie this whole discussion of cockpit resource management back to several of the key issues that Paul Caro raised in his paper this morning. There were several important themes that Paul raised in his paper, but I think one of the most important points was that any training program for flight crew members has to be based on a consideration of what the requirements are. We have to understand the objectives.

We've referred to it as ISD, specific behavioral objectives and so on and so forth, and I want to tie all of these together, because there is a bit of a tendency to compartmentalize. It's easy to think about technical training programs and computer-based training programs and cockpit resource management training programs and self-esteem models, and to compartmentalize these and not really think about all of these things as being elements of a training program which is trying to turn out a trained individual, who is trained to the exact specifications and requirements based on our best understanding of those requirements determined by the equipment and the environment in which those people operate.

So keep in mind that in all of this we have to understand what the requirements are, based on what's driving it, the system, the environment, the equipment, the people that you put into the training system and that these are all elements of one training program. They are not a collection, a haphazard collection of training programs that address piecemeal various elements. It has to be an integrated approach in the long run and that was one of the reasons we wanted specifically to explore that.

With that it's time for the break. And then when we come back we are going to hear some reports from various individuals of the RAA training and operations committee who have been working in the past several months on various approaches.