Research, Engineering and Development Advisory Committee
Federal Aviation Administration
800 Independence Avenue, SW, Washington, DC
September 20, 2005

Meeting Minutes

On Tuesday, September 20, 2005, the Federal Aviation Administration (FAA), Research, Engineering and Development Advisory Committee (REDAC), held a meeting in the Bessie Coleman Room, at 800 Independence Avenue, S.W., in Washington, DC. Attachments 1 and 2 provide the meeting agenda and attendance, respectively.

Welcome and Introductory Remarks

Dr. John Hansman, REDAC Vice Chair, welcomed the members and audience participants. He noted that the September REDAC meeting is usually a joint meeting with the National Aeronautical and Space Administration (NASA), Aeronautics Research Advisory Committee (ARAC). However, due to schedule changes the NASA ARAC was unable to attend.

Ms. Joan Bauerlein, REDAC Executive Director, read the public meeting announcement and thanked everyone for the good work that has been done over the past six months. She encouraged comments and views on the work to be presented.

Financing the Next Generation Air Transportation System Working Group Observations

Mr. Jerry Thompson, Chariman, briefed the latest version of the working group's general scheme to find a baseline with and without the Next Generation Air Transportation System (NGATS). The Committee's job is to talk about money needed to finance the FAA, particularly, the transform between the National Airspace System (NAS) and NGATS. The "roll out" scenario of NGATS has led to basic answers to questions such as: How does NGATS look? How can we transform the National Airspace System (NAS) to NGATS? What is the process for doing the transformation, and what is the price?

Mr. Thompson presented several charts indicating the objectives, productivity, capacity and services to users for NGATS in four, five-year blocks of time. This also included strategies and a list of roll out capabilities to transform from NAS to NGATS. The charts indicated the R&D programs the working group believes are necessary to support the roll-out capabilities, the F&E programs to implement them, as well as a list of operational activities they believe are necessary to make it useful. He said that the numbers at this time are tentative and are being revised by Joint Planning Development Office.

He stated that the Subcommittee has recommended required funding levels of $15B per year for the next ten years to finance NGATS. Along with the idea of imposing a tax on users, the working group has identified five options to consider for financing the NGATS. These options are listed below.

An amended version of the current alternative
A flat gas tax alternative
An international rate, distance, and weight alternative
A premium service fee approach
A fixed fee per operation, plus a variable fee, based on time in the system

Mr. Thompson reported that there is a shortfall in revenue that needs to be bridged, somehow. One of the reasons attributed to the shortfall is the continued airline ticket price decline, which has reduced the tax revenues. To counteract the reduction, the group proposed adjustments to current income sources, which include: the general fund contribution, the fuel tax, the ticket tax and the waybill tax. The group projects that in the long term the NAS will have higher associated costs than NGATS. NGATS has been identified as a system that provides needed capacity while reducing operations cost.

Dr. John-Paul Clarke asked about moving a billion dollars onto the users and if the current revenue schemes are the correct choice to get the costs distributed appropriately among users. He also felt that the users would argue about the general fund not doing its share.

Mr. Thompson responded that no one is arguing about the fact that having NGATS is probably cheaper than not having it. However, it comes down to whether or not there is anything that can be done to reduce the operational productivity of FAA. The FAA Air Traffic Organization (ATO) is also trying to reduce costs as best as they can. They are implementing a cost reduction campaign focusing on reducing absolute cost, which tend to translate the whole model upwards. They are also focusing on increasing productivity, which tends to translate the model downwards. He said the payoff of productivity improvements in costs is just "awesome" and the real productivity benefits will materialize by an interjection of technology. This is a twenty-year campaign; there is a constant amount of work to do for the next twenty years to implement NGATS. We also know there is a real shortfall that we must do something about, somehow.

Dr. Clarke asked for an explanation of a proposed alternative such as the flat gas tax.
Mr. Jerry Thompson explained that this alternative allows you charge .50 or .60 cents per gallon for domestic flights, with international rates decided upon by distance and weight. This is an alternative that is used in many places. It is also a supplement because it would not generate enough money on its own to pay the bill. The key issue is deciding which user class should pay, and how much they should pay.

Dr. John Hansman said it had been mentioned earlier that it is cheaper to do NGATS than not to do NGATS. He asked if only delay levels are being looked at or has the group tried looking at the dollar savings of doing it. Mr. Jerry Thompson replied that the group did evaluate dollar savings, but nothing is clear at this time. Attaching dollar savings for NGATS is important, especially since delay costs are very real, and they end up not being governmental costs. It would be useful for the group to capture this data. It would help close the loop on presenting a case for NGATS.

Mr. John Douglass added that we must look at air traffic in its whole manifestation as commerce. It is about 15% of the gross domestic product. He said if the current system is not saleable to be able to move the traffic that we have, then we are contributing to a suppression effect on the

entire economy. We must address this issue. We cannot "not" do the research or appropriate the money required. The issue is: "How to do it most effectively?"

Dr. Hansman asked if there was a planned fallback position in the event that other supporting agencies pull back from their support and research in technology. Mr. Thompson said that the implementation of the technology is essential. Without it, we would have to push back the implementation of NGATS. He also pointed out that the review of NGATS is still in progress. The working group is not putting it forward as a formal document at this time.

Mr. Jerry Thompson responded to a number of other comments and questions from the floor about the NGATS scenarios.

Action: Mr. Jerry Thomson requested feedback, suggestions and guidance from the REDAC on the options proposed to transform to NGATS. He needs this information so that his group can complete this task, write the final report and present their final recommendations to the FAA Administrator.

Subcommittee on Human Factors - Air Traffic Control (ATC) Workforce Development Efforts

Dr. John Hansman stated that due to scheduling and other issues Mr. Kevin Corker was unable to attend and he would give the briefing. He presented a summary of the work the Human Factors Subcommittee has done over the past year regarding the training of the next generation of air traffic controllers. About a year ago, the Administrator asked the REDAC to review these issues and to assess related FAA plans and activities in view of emerging new requirements. Soon, large numbers of controllers will also be facing mandatory retirement. He presented a graphic illustrating the problem over the next 10 years. Although the Agency hired and trained 13 controllers last year (a typical year) it will soon have to train about a 1,000 controllers a year.

For the past five months, the Subcommittee reviewed the Agency's training and workforce development plans in depth and came to these findings: (Attachment 3 provides the Committee's recommendations to the Administrator.)

"The Plan for the Future, the FAA's Ten Year Strategy for Air Traffic Control Workforce," is commendable, but its emphasis on operational and management details differs from the Subcommittee's focus.

The committee has significant concerns with the speed and efficiency of the current training process and its ability to meet the demand in the next 5 years. The current training plan is to take the existing way we train controllers and alter it slightly to achieve new efficiencies. But it doesn't really look at the training itself and ask whether it is what is needed. Given its present speed and efficiency, the training process will be hard-pressed to meet the demands, even in the next five years.

Recommendation: The Committee is looking for opportunities to improve these conditions and recommends a number of solutions. An essential element is that the FAA immediately designates an individual responsible and accountable for coordinating the necessary interdependent activities. And that individual should be given sufficient executive and budgetary authority to implement the plan across the Agency.

Recommendation: The Subcommittee recommends, near term, establishing an independent review team to study the process and the curriculum and in the far term, developing the training program for the future.

The current controller selection process is extremely complicated, for a variety of reasons, including Office of Personnel Management issues. The ideal training process would be requirements driven, performance (not time) based, and standardized, when useful, across work locations. It would focus on determining necessary skills and attributes required in trainees or developing these skills and attributes in them. A complete review needs to be done on the "age 56 exceptional controller" process.

Dr. Hansman pointed out that we do not have very good measures for training effectively and that today's training is largely time-based as opposed to performance-based.

Recommendation: The FAA needs to develop and implement performance-based metrics and standards for Collegiate Training Initiative Schools (CTIs), the FAA Academy, facilities and on-the-job training. This would include standardizing, as much as possible, scenario characteristics for training, exploiting advanced simulation technology and the development of a common set of controller skills. The Agency should look at best practices and lessons learned in air transport operations training and consider its application to controller performance.

Simulation technology is used in the current training protocols, but it isn't properly exploited. There is an over reliance on labor intensive, full fidelity simulation to mimic the real world and an ineffective use of computer based training. This needs to be evaluated and matched to the training outcomes and effectiveness. One of the training approaches proposed is the Runway Safety Action Team (RSAT) system from MITRE.

Recommendation: A set of technology requirements for the use of simulation needs to be developed that will support technology requirements and performance-based training objectives. Required skills need to be identified and mapped to training technologies and training objectives.

It should not take a controller three years to come up to full performance level, when they are already at full performance level at another facility. This is happening because our procedures are not standard enough and much of the training involves memorizing a huge amount of information that isn't actually used on a day-to-day basis.

Recommendation: More standardization is required with the objective of increasing the efficiency of cross facility transfers. Also focus is required on procedure simplification and identification of full-end positions so that sectors designed to be relatively easy can be trained quickly.

Some ATC facilities have a hard time staffing because of cost of living or other issues. In some facilities traffic varies at certain times of the year. And there are certain areas that need more controls than others. The system needs a way to fill positions temporarily and move people when necessary. Standardizing training procedures with varying levels of detail could help to deal with these cross-facility issues.

It might be possible to reduce or change present levels of detail in some of today's training. Is it necessary to memorize so many details when they could be put on a fact sheet or display? Might it be possible to anticipate aspects of future equipment, and prepare for the types of changes they will require?

There are approximately 12-15 CTI schools; none of these facilities have a common curriculum. One of the problems identified with controller training is that there is a breakdown in the relationship between the FAA and the CTI schools. The FAA has not given the CTI schools enough guidance as to what the training could be to improve the efficiency of the system.

Recommendation: Give clear guidance to CTI schools that will allow their graduates to advance in the Academy training.

The CTIs do not have a common curriculum. The FAA has not given the schools clear guidance as to what they could do that would improve the efficiency of the system. There is a huge pool of potential talent here, but guidance is required. Students at the CTIs have already made a large training investment. The system should find ways to recognize that demonstrated interest. Perhaps graduates should be issued credits toward their future training. CTI schools and the Academy are equipped to do more than they are being asked to do. Dr. John Hansman agrees with this observation. But he added that one would have to go through the curriculum and the plan very carefully before trying to articulate what those extras would be – as well as what the performance standards would be for graduation.

Dr. Hansman was asked how many students the CTIs graduate per year. He estimated the number at roughly 100 to 150 per year, per school. Taking every student from all of these schools, the numbers would remain insufficient. Still, he said, this is a resource of people with demonstrated interest that we're ignoring.

Mr. Amr ElSawy pointed out that, as none of the CTI schools has the capacity to take on the entire training task, it would have to be shared by institutions. This amounts to a win/win situation, both for CTIs and the Academy. But, unfortunately, it isn't always perceived that way. Dr. John Hansman agreed that the task was huge, the potential was great, and there is work enough for everybody.

Ms. Joan Bauerlein cited aspects of the history of controller training and recognized that, by this time, the Agency should be doing more to support the program. Dr. Hansman agreed about the past issues, but he returned to the upcoming need to prepare many more controllers than ever before. Similarities to collaborative learning environments coupled with the new urgency, he said, offer advantages – both in terms of changing the culture and creating some direct training efficiency. The challenges the Subcommittee and the Agency face actually amount to an opportunity. Again, he stressed the need to get a valid focal point in examining and evaluating the entire process – and then accelerating corrective efforts.

Action: Dr. John Hansman said a summary of identified training opportunities would be put into a letter and forwarded to the FAA Administrator following the meeting.

Mr. John Douglass said that these issues are part of a national issue that cuts across the whole industry. He complimented the Subcommittee on its effort and encouraged them to press ahead with it. Dr. Hansman agreed and commented that it is useful to have an outside perspective

pushing for an effort such as this. From the inside, he said it is easy to think, "Okay, we can handle it; we've got this under control." But the fact remains that, without a new approach, the system is likely to be inadequately staffed and operating well below its theoretical capacity when a new generation of solutions is needed.

Dr. Hansman responded to wide-ranging comments from the floor. The observations were all in basic agreement with the presentation and recommendations.

Joint Planning and Development Office (JPDO) Subcommittee Update

Dr. John Hansman updated the committee on the JPDO Subcommittee for Dr. John Hamre who was unable to attend. The Subcommittee has met with the JPDO group several times since the last REDAC meeting.

He reported that technically, the NGATS Program seems to be maturing and has made significant progress. The Advisory Committee is working with JPDO to find ways to increase the interdepartmental interaction, particularly with the DoD. There are some specific opportunities in Homeland Security, which the Committee thinks is important.

There are many policy issues, such as the issue previously briefed on controller hiring. From a network centric view, policy issues involve security, privacy, and many other kinds of important issues that need resolution. The Committee has begun making a list, but hasn't worked out how they can be resolved.

In looking at the whole view of the network centric system, many questions arise, for example: "Where do you define the boundaries of the system." And, if this is a U.S. system with a U.S. network, "What are the interface requirements that will go out to the rest of the world and are we clear about these?" "Are we going to allow the rest of the world to drive the definition of the U.S. systems?" Dr. Hansman posed the idea of replacing the term "National Airspace System" with "World Airspace System," since the system is to be inter-operational at some level. The Committee has discussed some strategy on specific international collaboration both in Europe and Asia.

He commented that future systems would require spectrum, or at least protecting the spectrum that we currently have, and that it would be used in different ways. Spectrum protection is the "Achilles heel" focused upon a great deal in technical issues and control automation. If spectrum is lost, the entire system goes down. The Committee really needs to be doing its homework to be protected in that domain.

Dr. Hansman said that NASA is in the middle of making changes and the dependency of the Agency's plans upon NASA seems to have created a general sense of unease and vulnerability. He said that we must figure out how much of an impact the changes will have and understand all of the issues involved. Ms. Joan Bauerlein added that neither the public nor the Congress completely understand all the issues involved. Dr. Hansman agreed, and said that we have not been effective enough in really demonstrating the importance of the air transportation system or the need for this investment in modernization.

To reiterate his point, Dr. Hansman used an example given by Mr. John Douglass about the huge cost to the government recently because they did not act earlier and make a lesser investment in

repairing the levees in New Orleans before Hurricane Katrina. This inaction was very costly. Dr. Hansman said that this is a good example of how we have to think about infrastructure, we need to ask such questions as: "Is this is a generic issue of U.S. investment and infrastructures?" "How do we pay for it?" and "How do we link it to the economy?"

Value is much easier to understand when you are in a strongly growing economy and building in a region that doesn't have a road or an airport. But, it seems to be of less consideration when you are only maintaining a road or airport that you already have in place. Dr. Hansman said that the public needs to understand that they are not going to get benefits from the system until 2016 and that we need to make a more compelling argument.

Remarks – Honorable Marion Blakey

Ms. Blakey, FAA Administrator, welcomed the members and expressed her appreciation for the on-time efficiency of the meeting. She briefed the members on the status of FAA activities. She said that this has been an incredible time from an aviation standpoint because of the monumental efforts extended during Hurricane Katrina. She said that many individuals in the field of aviation had distinguished themselves in a way that was remarkable and unparalleled in her experience.

As we are returning now to a more normal routine, we are dealing with our submission to the Office of Management and Budget (OMB) for our '07 budget. The President says that there will be no additional tax support coming in; therefore cuts are going to have to be taken somewhere. At this time, we don't know what it means and have no idea how that might affect things. But, we are moving forward with a budget that not only supports the FAA's needs from the standpoint of our on-going safety and operation requirements, but also supports the NGATS in a way that you will not have seen in the budgets before Ms. Blakey said she hopes that it continues to do well. But, it is impossible for us to know because there are always competing priorities.

Ms. Blakey reiterated that we should all should understand that we are very, very serious about the support for NGATS, about being able to provide the key next steps on that roadmap and the fact that we intend to also see that there is a reality in the form of early successes, early victories, demonstration projects, etc. This is critical because the private sector is going to place a greater and greater role on this as we move further into the NGATS. She said that on the environmental front there is concern about some of the areas that may or may not be able to be addressed in the near term, which could be an inhibitor from the standpoint of moving aggressively into the NGATS.

Ms. Blakey pointed out that we have had a long and good relationship with NASA for many, many years. A great deal of the research that the FAA depends upon is accomplished at Langley and Ames and other places. She stated Mr. Mike Griffith (NASA) cares tremendously about the fact that NASA has to operate efficiently and well and that they have had a number of conversations over the summer.

NASA is under great pressure at this time. The discussions we are having right now are focusing on alignment. Mr. Griffith has committed to supporting the JPDO on equal basis with the FAA, which is the way we have been going forward and the way we want to continue. I see that as a very good sign. Also, we both have committed to transparency in our budgets. We are sitting down this week to look at the '07 budgets together and talk about alignment and to see where the gaps may be. The issue of alignment is not singular at all to NASA; it has to be across the

agencies. We are just going to have to work very hard to see if we can close any gaps that we find.

Ms. Blakey invited questions and comments from the members.

Discussion:

Mr. Amr ElSawy asked about the Automatic Dependent Surveillance – Broadcast (ADS-B) program decision and when it could be expected. Ms. Blakey said there is no bigger fan in the room than she is for ADS-B and that she is very keen for us to move forward aggressively in this regard. At this time, however, there are still a number of different issues and caveats that need to be worked through. But, the announcement will probably be in a matter of weeks, rather than months. And, it may be an agenda item for the fall, however, the exact shape or specifics involved, are not nailed down at this time.

Mr. Don Richardson referred to the controller training issues that were briefed earlier in the morning and expressed his concern that only 13 controllers have been trained this year, while the requirement is going to go up to train 1,000 controllers a year. He said this is a massive program and hopes that the issue stays at the top of the agenda.

Ms. Blakey responded that the controller issue would certainly stay on top of her agenda. She said the number "13" was the number of controllers trained last year. However, this year, the number was about 469 and that we are actually hitting the numbers that we are supposed to make. She said that we had gone though a real set back for a while because of a lack of understanding by Congress about controller retirement and we had been losing more than we gained. She said that the Administration had asked for money, but between rescissions, pay increases and other factors, the money was simply not there.

She said that we are trying to be as clear and firm as possible on controller hiring. They must take into account all kinds of budget requirements and then fund the operational costs of hiring the overlapping numbers of controllers, so that we hit the numbers in the plan. If we can stay on target on the plan in '06, '07, and '08, etc., we will be all right. Ms. Blakey said that we are making it very clear that the funding has to remain in tact for that. She said there is a fairly good understanding up there now because that number "13" sort of got everyone's attention.

Commenting about NGATS, Mr. John Douglass, said that we are very pleased that the initial requests for participation that have come through for the Integrated Product Teams (IPTs). He asked if there was a schedule to increase industry involvement in the various divisions for the JPDO and even at higher levels. Ms. Blakey said the Institute is still in its infancy, but we are very encouraged about it. The funding that we are anticipating in '06 includes some substantial funding that the Institute would be expected to tap. She said that we are asking for the best and the brightest controllers out of the industry.

Dr. John-Paul Clarke asked about the changing role of controllers for future systems, NGATS, etc. which will involve more than just hiring issues. He said it seems to be the time to be thinking about the skill sets or the attributes that we want in the controllers that we hire, since the roles are going to be different. By looking at this now and deciding how to train controllers, or at least get a slightly different set of skill sets, it will be important when they are actually placed in the field and when we bring in the new technology.

Ms. Blakey responded by saying that Dr. Clarke was "on-the-spot" about this need and that there are a number of interesting questions that accompany the idea. She said if we train controllers the way we have always trained them, with a very set process, we would get the exact product that we have right now. Considering that we are going forward into a totally different system on so many levels, this will not make any sense.

At the same time, Ms. Blakey said, the world that controllers are going into immediately still has some of the old technology and will have for some time to come. For that reason, this will be a "transition generation," of controllers that are coming in. She said that we should address the "larger cultural" issues and environmental issues for controllers. This means developing a workforce that has a mindset to embraces new technologies. The personnel must look forward to seeing themselves as managing exceptions in a system that is highly automated. This career is for the generation that has grown up on incredibly powerful computers and incredibly sophisticated software and wants to see themselves as being involved in, as opposed to folks who still like the idea of talking on radios.

This is going to require a major shift in mindset at some point along the way. She said that she is not satisfied that we've given thought to this. Ms. Blakey said she thinks that the earliest groups of controllers going through the Academy are not going to have the benefit of the kind of education and the kind of training that we need for them to have. She said she is very concerned about this. She will be meeting with John in the next day or two to discuss this subject.

Mr. Jerry Thompson commented that he believes one of the major things that need to happen at NASA is routine separation and sequencing with machines to get early benefits in productivity. He said it is important to keep that work alive and that NASA doesn't pull away from that. Another related element is that if NASA is going to go back to basic research and move away from the upper levels of the transform, FAA will have to coordinate the void. This means that the research budget, staff, organization, etc. are going to have to focus on this. This changes the role of the FAA's research community, as we look further into the future. Mr. Jerry Thompson said he thinks that means "money," probably a half billion, or so, in the research business starting in the next 3-4 years.

Ms. Blakey said that she shared his concern about the research-funding gap. She thinks there may be some hard choices that are going to have to be made within this Administration and within the Congress about what takes priority at this point because there is a very strong case to be made for the far out long-term basic research. The thought that the FAA's budget would pick up a half billion dollars in research money is one that is certainly going to take a heavy "lift" on the part of the community, as well as within the Administration, because it flies in the face of about two decades of past experience. It simply that has not been the way research money has been structured.

As you know, we are also going through a very lively debate on the issue of how all this should be funded. And, to the degree that you are looking at user fees from the community, all cost-based, I think it will be challenging to have the user community see that level of research being something that they want to pick up the tab on. Now, I have never worked from anything but the assumption that there will be funding coming from the general fund from the broad taxpayer base for portions of the FAA's work. And, traditionally the research arena can be seen in that. But, that would be a huge lift to get funding on that level, we'll see.

Mr. Thompson commented that at the moment, we are working with your people to scrub down these numbers. He said that he still thinks the number is much bigger than the former number; it's not a $120 billion, rather it's some multiple of that. Ms. Blakey said we are all trying to figure out what is absolutely core, unquestionably critical and required in order to make the best case that we can make for it.

Mr. Paul Drouilhet pointed out that during the past years, NASA and the FAA have had partnerships on specific programs and have developed joint research management plans in which both agencies allocated tasks for certain programs. In the past, NASA has done research without sufficient involvement with the FAA; what they produced wasn't really what the FAA could use. There was a gap, and the research sort of fell though the gap.

Ms. Blakey said that this is something that is important. We really have to make this work from the standpoint of the teamwork between NASA and the FAA. NASA has formidable resources in terms of its people, personnel and facilities. She said she thinks it has been an area historically where there has been some significant shortfall from time-to-time. It is also important that the work being done by NASA is also relevant and important to FAA.

Mr. Drouilhet commented that NASA, Langley and Ames have developed a fair amount of operational understanding in the past years of working closely with the FAA and MITRE. It helps them direct what they are doing in areas that are productive in short and intermediate terms. He said this could be lost and result in a gap that would not be good for FAA.

Ms. Blakey said there would be no movement on our part to step back in any way from the partnership or our commitment in these working groups with NASA. She said that everyone is aware that NASA is doing a major re-structuring. How the shifts and re-organization are going to align, or make sense from the FAA's standpoint on how to structure those working relationships, is very much a work in progress.

Transitioning Air Traffic Management Research into Operational Capabilities - Report Approval

Under the leadership of Mr. Ray LaFrey, a study was begun about a year ago to look into plans to transition FAA research projects through to their operational use in the next generation of the National Airspace System.

He stated the overall objectives of the study were to identify barriers to successful transition and to recommend effective solutions. A basic definition of the task and an actual working group were set up. Research falling within the group's province could include projects sponsored by the FAA R&D Division, industry, or other organizations. Once such research was judged ready, or soon to be ready to return benefits, its transitional stage would start. The transition would end once the system or technology demonstrated a field capability to add value to the ATC system.

For three months, the group gathered input from over 30 organizations representing all walks of the aviation community before rolling the results into a preliminary set of findings and recommendations. They presented their preliminary findings to a workshop, conducted some

additional analyses, developed a final report, and briefed it to the ATS Subcommittee. Mr. Ray LaFrey presented a summary of the 24 recommendations in that report.

Dr. Hansman commented that the group had done a huge amount of comprehensive work. He said that 24 recommendations might be too many. He asked if there might three or four key issues woven throughout the report.

Mr. Ray LaFrey chose the four recommendations as the groups key issues.

Always look at lessons learned from the most successful programs to see what relationships had made them successful.

Ensure there is someone senior, at the Associate Administrator level, who to champion the program.

Have a senior advisory panel look at the technical risks early to be sure the risks are openly and honestly addressed before enthusiasm and emotion take over.

The report was approval and will be transmitted to the Administrator.

Presentation of Subcommittee Reports and Associates Comments

The standing subcommittees review FAAs R&D investments in the areas of Air Traffic Services, Airport Technology, Aircraft Safety, Human factors and Environment & Energy. After reviewing the respective portfolios proposed by FAA, each subcommittee generated recommendations. The subcommittee chairs listed below presented their subcommittee's recommendations. Attachment 4 provides the Committee's recommendations transmitted to the Administrator.

REDAC Subcommittee	**Subcommittee Chair**
Air Traffic Services	Mr. Jerry Thompson
Airport Technology	Mr. Jim Wilding
Aircraft Safety	Mr. Rom Wickens
Environment & Energy	Mr. Steve Alterman

Aircraft Safety Subcommittee - Discussion

Dr. Mike Bragg said that they are actively working with the regulatory communities, looking at future research program reviews, and continuing their action with all the Agency executives. He said that they enjoy meeting with all the researchers and seeing their enthusiasm. He hoped that the Committee is adding value as they make these recommendations and put them forward.

Ms. Peggy Gilligan addressed the group and thanked the Subcommittee members for the substantial work that has been done. She said that they would take all of the recommendations and look at them really closely. She said that they share the perspective about past accidents not being the only indicators of risk and that there needs to be a better understanding of future and unidentified risks. She said they are working closely with NASA, although their funding also will be a part of our discussions.

Ms. Peggy Gilligan stated that they are very supportive of the work for the JPDO and are aware that NASA has also made a commitment to continue to support the JPDO. The more detailed recommendations of the Aircraft Safety Committee, she agrees, are very much the questions we need to be looking into and answering. She said Mr. Nick Sabatini asked that we specifically identify: those who are the researchers and those who are our sponsors, determine if the sponsors know what they are sponsoring, and whether or not the researchers know who is sponsoring them. And, having once made those connections, we are to identify whether or not they are sponsoring the right work and whether or not there are initiatives that the research community can identify to consider more seriously.

Ms. Peggy Gilligan stated progress is seen on some of the recommendations. She said the Committee had reconfirmed some of the tasks that had been started, which they believe are the right things to work on. She said that Subcommittee also has pointed out some of the areas in which we aren't focused, but need to be. Ms. Peggy Gilligan promised that they would respond to the recommendations and advise on those areas in which to move forward and on those that either we aren't, or can't move forward as well as the reasons for the decisions. She reiterated how much the work of the Subcommittee is appreciated.

Dr. John Hansman commented that the issue brought up concerning the requirements flow to the researchers is something that he also saw in the Human Factors group. He said there is a need for some type of process by which the researchers can suggest non-anticipated topic and then provide a feedback loop in place that responds on the value of the topics, as opposed to just waiting for the flow down. – "How to manage that is the question."

Ms. Joan Bauerlein offered her observation on the System Approach to Safety Oversight (SASO) Program. She said that on a number of occasion where she has asked them to brief her about what they're doing, it had been her sense that there continues to be a disconnect between what the researchers understand their requirements are and what the requirements actually are. Ms. Joan Bauerlein said this is something that we need to keep working on.

Ms. Peggy Gilligan responded by stating that they share that continued concern and that they are trying, every day, to build a plain language explanation of what it takes for us to build the infrastructure that is needed to meet the systems safety approach. She said that for some researchers, the requirements are very clear; for others it continues to be a struggle. She said they would need to bridge that gap and that they are continuing to work on that.

On behalf of the SASO Program, it was noted that for a period of about a year or so, we really thought that between the SASO Project Team and the sponsor, we had made some real progress and had come to a mutual understanding. We certainly shared the understanding of how important this program can be for the long term for safety and improving efficiency. But, at the most recent meeting, we were somewhat taken aback. There were new people managing the system and some changes in the requirement; it seemed like that we had taken a step backwards. This is probably just a matter of new staff needing to catch up to speed. But, you cannot forget that we have made some real progress, and that SASO looks like a very worthwhile program.

Air Traffic Services Subcommittee - Discussion

Action: Mr. Jerry Thompson requested permission from the REDAC to pursue an investigation of separation standards, which is the first issue on the Subcommittees' list.

Dr. Hansman said that it was clear that separation standards are a key issue and a tough one. He said that an even deeper issue it to know what is the basis by which you make safety evaluations on systems, procedures of changes that will prove deficiencies in the system that are likely safe, but you actually have no historical basis because current standards weren't built on well-defined engineering criteria. Mr. Thompson agreed that was the basic problem.

It was also pointed out that, with many operational issues, it is difficult to analyze the impact of proposed changes without a well-defined baseline. It is believe that people "in the operating side" would welcome and support the kind of approach Mr. Thompson proposed for setting new safety standards. Dr. Hansman said that while supporting technologies have advanced since some of the safety standards were set, the community has continued to use the existing standards.

Mr. Thompson noted that a separation standards group, headed by Ms. Sarah Dalton will have a kick off meeting shortly. He said that the group isn't going to propose, without supporting research, that particular standards should be increased or relaxed.

Airports Subcommittee - Discussion

Mr. Jim Wilding commented that Airports is not a large R&D program. It has tended to be funded at an annual level in the mid-teens of millions of dollars. The FY 2006 request now pending on the Hill, however, might bump that up to over $20 million. This increase would not include additional money for the Airports Cooperative Research Program, an effort minimally started last year to mirror programs in other areas of transportation. Additional funding for this emerging program could raise Airports R&D annual funding to about $30 million dollars.

Mr. Wilding was asked for details about a recent accident in Toronto involving an A340 aircraft. He noted that, while slides were used successfully to evacuate the airplane, the height of the craft made initial evacuees uncertain about what they would find at the bottom of the long slides.

Mr. Jim White, FAA added a comment regarding the Toronto A340 incident. It was clear, he said, that the Agency is actively improving runway safety areas. Although the emergency response was very fast in Toronto, an installation of the Airport Movement Area Safety System (AMASS) would have helped. Ms. Joan Bauerlein agreed that the costs of AMASS can be offset by not losing an airplane off the end of the runway. She believes the system should be installed at more airports.

Environment and Energy Subcommittee - Discussion

Dr. Hansman recalled that the Air Force was doing a fair amount of work on low impact de-icing fluids several years ago. He suggested that the Subcommittee might look into this to see if there is an opportunity in this area.

Mr. Carl McCullough said that at the next Environment and Energy Subcommittee meeting they would have someone there to represent Air Force research who would give them a run down on

this He also reminded members that if they had any other ideas that should be passed along between the FAA and the Air Force, or any of the services to let him know.

Dr. Lourdes Maurice commented that we could leverage both the areas of water quality and de-icing with the DoD and the energy area as well. She said DoD had a very good program to develop jet fuels from alternative sources in the 1970's and 1980's. And, it was very successful. The only issue being that the fuel cost between $2 and $3 dollars a gallon, and you could buy it for 80 cents gallons after a sudden oil glut. The Air Force is working with the Department of Energy, with this type of activity. She requested that energy be added to Mr. Carl McCulloch's list as well.

Mr. McCullough indicated that this is already on their list. He said that he understands that one of the Navy's fiscal '08 focus areas is to decrease reliance on oil as an energy source; a fuel source. He said that to the extent the services could share their research, we are happy to do that. And, I think it's there with regard to noise, in terms of propulsion and airframe design as well. He said he would add this to information for the next meeting

Mr. Steve Alterman added a final comment by thanking Dr. Lourdes Maurice and Mr. Carl McCullough for their support. He also recognized Dr. John-Paul Clarke for his support and for the wonderful job he has done.

Final Discussion and Recommendations

Dr. Hansman asked members for final comments or questions. He proposed writing up the Subcommittee reports and moving them forward the FAA Administrator. Since the NGATS Working Group is still in evolution on financing, their report will be briefed informally, but not put forward formally at this time. Air Traffic Services is going to look at separation standard as its focus issue. Separating out navigation and automation flight issues, as well as Local Area Automation Systems (LAAS)/Wide Area Augmentation Systems (WAAS) remain issues. There were no objections to these actions.

In closing, Dr. John Hansman commented that there is a close relationship between FAA and NASA. If one partner in such a relationship changes its position, the nation needs to figure out how to step up and deal with it. Hopefully, we will soon be continuing our good relationship with NASA. We should have more details about this by the next meeting.

Dr. Hansman thanked members for their participation and adjourned the meeting.

Attachment 1

Research, Engineering and Development Advisory Committee
Federal Aviation Administration
800 Independence Avenue, SW Washington, DC – Bessie Coleman Room
September 20, 2005
Agenda

9:00 a.m.	Welcome	John Hansman Joan Bauerlein, FAA
9:15 a.m.	Road Map - Next Generation Air Transportation System	Jerry Thompson John Fielding
10:15a.m.	Subcommittee on Human Factors – ATC Workforce Development Efforts	John Hansman
11:00 a.m.	Update: JPDO Subcommittee	John Hansman
11:15 a.m.	Break	
11:30 a.m.	Comments	Hon. Marion Blakey
12:30 p.m.	Lunch	
1:30 p.m.	Report Approval – Transitioning Air Traffic Management Research into Operational Capabilities	Mr. Jerry Thompson Mr. Ray LaFrey

Subcommittee Reports - Presentation of Written Reports & Comments from Associate Administrators

2:00 p.m.	Subcommittee on Aircraft Safety	Ron Wickens Michael Bragg
2:30 p.m.	Subcommittee on Air Traffic Services	Jerry Thompson
3:00 p.m.	Subcommittee on Airports	Jim Wilding
3:30 p.m.	Break	
3:45 p.m.	Subcommittee on Environment and Energy	Steve Alterman
4:15 pm.	Discussion – Committee Recommendations	John Hansman
5:15 p.m.	Adjourn	

Attachment 2

Research, Engineering and Development Advisory Committee (REDAC)
September 20, 2005

Attendance

REDAC Members

Dr. John Hansman, Vice Chair
Ms. Joan Bauerlein, Executive Director
Mr. Steve Alterman
Dr. Michael Bragg
Dr. John-Paul Clarke
Ms. Sarah Dalton
Mr. John Douglass
Dr. Colin Drury
Mr. Amr ElSawy
Mr. Terence Hertz
Ms. Christine Horne
Mr. Albert Kaehn
Mr. Ray LaFrey
Mr. Carl McCullough
Mr. Donald Richardson
Mr. Jerry Thompson
Mr. Ron Wickens
Mr. James Wilding

Audience

Howard Aylesworth, AIA
Michael Basehore, FAA
Hal Becker, AOPA
Jana Denning, AIA
Gregg,Dronak, NSTL
Paul Drouilhet, MIT/LL
Gloria Dunderman, FAA
Bill Edmunds, ALPA
Ed Feddeman, U.S. House
Warren Fellner, Titan
Paul Fiduccia, SAMS
John Fielding, Raytheon
Frank Frisbie, APPTIS
Mike Gallivan, FAA
Aaron Gellman, NWU
Richard Goruik, FAA
June Green, FAA/BAE
Keith Hagy, ALPA
Anne Harlan, FAA
Walt Hett, WHA
Karol Kerns, MITRE
Bruno Kisalab, SAIC
Jenny Kishuya, NASA
Terry Kraus, FAA
Andrew Lacher, MITRE
Frank Mangine, FAA
George Marania, FAA
Lourdes Maurice, FAA
Tom McCloy, FAA
Nelson Miller, FAA
E. Mori, GAO
Luis Ramirez, FAA
Herm Rediess, NASA
Roy Reichenbach, FAA
John Rekstad, FAA
Chuck Ruehle, FAA
Barry Scott, FAA
Chris Seher, SRA
Randy Stevens, FAA
Janet C. Stinnett, BAE/FAA
Nick Stoer
Ron Swanda, GAMA
William Wall, FAA
Hans Weber, TECOP Int'l
Jim White, FAA
Allen Wickman, PBFA
John Wiley, FAA
Kelli Willshire, FAA
Jerry Wright, ALPA
Andres Zellweger, JPDO

Attachment 3

PROFESSOR OF
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DIRECTOR
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November 8, 2005

The Honorable Marion C. Blakey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Ms. Blakey:

At your request during the September 2004 the Research, Engineering and Development Advisory Committee (REDAC) meeting, the Subcommittee on Human Factors over the past year, has reviewed the FAA plans and activities related to the skills training and needs of the next generation controller workforce in anticipation of the upcoming retirement replacement needs.

The committee commends the development of the *Plan for the Future: The FAA's 10-Year Strategy for the Air Traffic Control Workforce* but is concerned about implementation. The committee has significant concerns with the speed and efficiency of current training practice to meet the system wide and facility specific demands over the next 5 years. Concern is based on the 2-5 year time to train to CPC and the cost/time for position transfer-training to facility specific operations. A large portion of the training time is on-the-job training. This process is of uncertain efficiency and requires significant controller resources.

The committee sees an opportunity to improve effectiveness and efficiency of the recruitment, selection and training process (at all stages: Collegiate Training Initiative, Academy, and on the job training). Specific observations and recommendations include:

Leadership

Observation: Currently there are many activities associated with implementing *A Plan for the Future: The FAA's 10-Year Strategy for the Air Traffic Control Workforce,* but there is no focal point for leading the various efforts from an integrated human-systems perspective.

Recommendation: The FAA should immediately designate an individual to be responsible and accountable for all the interdependent activities associated with the implementation of the "Plan for the Future." That individual should have executive and budgetary authority for implementing the plan. This authority should include all efforts regarding recruiting, selection, staffing, and training. It should also include coordinating the CTI schools, the Academy, OJT for terminal and en route. The individual should be accountable for evaluating workforce initiatives, for both the present requirement and for future NAS operational developments.

Training Process Enhancements

Observation: There are a number of initiatives proposed in the "Plan for the Future" focused on achieving gains in efficiencies and effectiveness in the training process with associated reductions in training time and costs. Much less emphasis has been placed on developing the right training program.

Recommendations: The FAA should immediately convene a workgroup and independent lean process review team to, in the near term, assure the response needed to meet immediate needs and, in the far term, develop the training program for the future. Conduct a complete review of the current academy training program and facility training programs, and the age 56 exceptional controller process. Consider new training approaches, eg concurrent Radar and Associate Training. Review options on centralized versus decentralized training.
Identify requirements and venues for training of advanced controller tools.
Support assessments regarding the use of simulation throughout the training process.
Training must be a requirements-driven and performance-based process. Training must focus on determined knowledge, skills and abilities to reach CPC. The FAA should accelerate current efforts in staffing standards model and functional requirements development

ATCS Performance Measures & Training Effectiveness

Observation: The assessment of Academy training and OJT effectiveness are hindered by a lack of metrics to ensure performance competencies, prioritize efforts to address training and remediation, and track controller development. Training seems largely time-based as opposed to performance and results based.

Recommendation: The FAA should immediately and consistently develop and implement performance-based metrics and standards for CTI, Academy, facility airspace, and OJT training entry/exit criteria to assess controller competencies. The FAA should seek to standardize, to the extent possible, scenario characteristics for training and exploit advanced simulation technology to converge on a common set of controller skills. The FAA should combine the use of objective measures of skill with behaviorally anchored rating scales to ensure effective use of training exit criteria. The

FAA should examine best practice and lessons learned in training for air transport operations and investigate their application to controller performance.

Use of Simulation

Observation: Simulation technology is not properly exploited in ATCS training. The subcommittee observes an over-reliance on labor intensive full fidelity simulation to mimic the "real world" as opposed to simulation fidelity selected to match training value. Also there is no basis for what should be trained at varying levels of simulator fidelity and an ineffective use of CBT and part-task simulation, which could increase training effectiveness at a lower cost

Recommendation:
In the next six months develop a set of technology requirements to support performance-based training objectives, identify and map skills to training technologies (CBT, part-task simulators, full fidelity simulation) to training objectives. It should also, address scenario and airspace specific development issues, evaluate MITRE (R-SAT) simulation training approach (and others) to be systematically matched with training outcomes for effective training delivery and investigate the use of simulators to provide early practice and testing.

Standardization of Procedures

Observation: A large portion of training at the facility is dedicated to learning local procedures and memorizing detail which is an artifact of prior technology limits. This is compounded by differences in local practices for use of common ATCS tools such as URET.

Recommendation: Immediately determine how to improve, staffing flexibility, OJT and Academy effectiveness through: Identification of general techniques and consolidation that standardizes procedures and training across facilities such as control techniques for certain operational flows. Facilities at risk of personnel shortfall should be targeted for early implementation. Focus on procedure simplification and support for controller rapid indoctrination in local techniques including enhanced processes for reducing training effort and off-loading sector-specific requirements to perceptual and decision support tool. In this process the agency should anticipate the impact of future initiatives in procedure and equipment to enhance procedural standardization. In the next year, determine how standardized procedures could be improved for use of ATCS tools

CTI - Academy Alignment

Observation: Collegiate Training Initiative (CTI) programs are seen as one way of expanding the FAA training capability. In order to exploit that possible expansion, the CTI programs need to be better aligned with Academy and FAA requirements.

Recommendation: Immediately, give the CTI schools clear guidance to allow their graduates advance in Academy training. Immediately establish minimum requirements for CTI graduates to enter Academy training as well as requirements for advanced Academy placement. Streamline the transition between CTI and Academy and support currency training during transition
Develop a program of feedback to the CTI schools using Academy statistics to improve CTI curricula including use of training technologies.

Use of Team Training

Observation: Use of team training is not addressed in *A Plan for the Future: The FAA's 10-Year Strategy for the Air Traffic Control Workforce*. Part of this strategy should be ensuring safety management and a reporting culture by indoctrinating controllers early on the value of teamwork.

Recommendation: In the next six months, implement an approach for leveraging the use of team training, whether in the form of team based collaborative learning, Air Traffic Teamwork Enhancement (ATTE), Crew Resource Management (CRM), or some other approach. Principles should be introduced at the Academy, and practiced in OJT.

Please contact myself or Dr. Kevin Corker if you would like to discuss these observations and recommendations or if the REDAC can be of further assistance.

Sincerely,

R. John Hansman
Co-Chair, FAA Research, Engineering and Development Advisory Committee
Professor of Aeronautics and Astronautics
Director, MIT International Center for Air Transportation

Attachment 4

PROFESSOR OF
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November 8, 2005

The Honorable Marion C. Blakey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Ms. Blakey:

On behalf of the Research, Engineering and Development Advisory Committee (REDAC), I want again thank you and the senior staff for engaging with the Committee at the September 20th meeting.

Regarding the 2008 budget requests, the Subcommittees generally agreed with the proposed efforts recognizing the limited funds available for research. The full committee did note the synergistic relationship between the FAA and NASA research particularly in areas related to Air Traffic Management, Aircraft Safety and the JPDO. If NASA refocuses it's efforts away from these areas then the FAA research program may not be adequate for the nations aviation needs. The committee recommends that the FAA continue to work closely with NASA to assure critical civil aviation research capability is maintained.

Regarding task focused efforts, the Subcommittee on Human Factors reported on the review of controller workforce development efforts and the Subcommittee on Air Traffic Services reported on study "Transitioning Air Traffic Management Research into Operational Capabilities". These documents will be forwarded to you under a separate cover.

Attached to this letter are specific recommendations from the Subcommittees on Aircraft Safety, Environment and Energy, and Air Traffic Services.

We stand ready to discuss these issues and recommendations or to assist you and the agency on other issues where you feel we can be of help.

Sincerely,

R. John Hansman
Co- Chair, Research, Engineering and Development Advisory Committee
Professor of Aeronautics and Astronautics
Director, MIT International Center for Air Transportation

Subcommittee Guidance for FY 08

Subcommittee on Aircraft Safety

Recommendation:

The subcommittee recommends that a procedure for identifying and funding R&D projects for emerging issues, not only issues causing past accidents be developed and implemented. The reason for performing safety R&D is to address potential problems which may lead to accidents in the future, and all of these can not be identified solely based on past accidents. We were routinely presented the unstated assumption that the world is not changing, and therefore past accidents are indicators of future accidents. This is valid in many operational scenarios that are relatively constant from year to year and of course should be used as one of the metrics for investing in safety research. However, in operational scenarios that are changing, we need insight into (and openness to) new issues. Many of these issues and potential safety concerns are the result of new technology being introduced into the system. Examples of issues mentioned at the meeting, that may create new safety concerns include copper-clad aluminum wiring, EMI issues with RFID tags, high ice-water engine icing encounters, etc. The committee also feels that a significant emerging issue is the future development and implementation of NGATS by JDPO. The safety-related issues relating to this transition should be identified now, and incorporated into the safety research portfolio in coordination with JDPO and ATS.

Recommendation:

The subcommittee recommends that a procedure for funding researcher-initiated R&D be developed and implemented. In the current process by which research is identified and prioritized the support of an FAA operational sponsor is required. While we support the current process for the majority of the research portfolio, the subcommittee feels that some percentage (15% was suggested) be reserved for researcher-initiated research projects. This could provide many benefits to the FAA and the aerospace community. It would facilitate the research on emerging issues as laid out in Recommendation 1, encourage innovation, improve flexibility and the ability to cooperate with NASA and other research organizations, and improve the participation of universities and the training of future engineers and scientist on FAA-oriented research. Such a program would also assist in attracting and retaining well-qualified research staff at the FAA.

Recommendation:

The subcommittee recommends that research be well connected with operational needs and that researchers and managers be able to articulate this connection. Most researchers were well aware of relevant R&D at other agencies, and operational impacts of their work. Not all presenters were inconsistent in very basic terms such as “large aircraft”, “air taxi”, “commuters” and “regional” vs. “commuter” service. Management and researchers in applied R&D should be in contact and well versed in the operational connectivity of their work.

Subcommittee on Environment & Energy

Issue 1: Achieving Budget and Portfolio Content Alignment with Key Agencies

The subcommittee noted that the needs to address the environmental challenges of the U.S. airspace system greatly exceed the available resources of any one agency. There is a shortage of funds and a critical need to achieve synergy of funding. This is particularly relevant of NASA, EPA, Department of Commerce (NOAA) and DoD.

Recommendation:

The FAA Administrator should seek to enhance collaboration in environmental research and development with NASA, EPA, DoC, and DoD through the Joint Planning and Development Office (JPDO) environmental Integrated Product Team (EIPT) as well as other appropriate forums. The Administrator should also ensure that there is representation from FAA's Office of Environment and Energy in the research and development advisory structure of each of these agencies.

Issue 2: Portfolio Content

The programs in the current FAA environment and energy research portfolio are the byproduct of years of discussion amongst all stakeholders; hence the portfolio has the right content to address short, mid-term needs and the FAA should continue ongoing projects in FY08. However, the subcommittee also identified additional needs and an overarching need to address the balance in FAA's environment investment in all budget categories.

Recommendation:

The subcommittee asked that FAA address fuel/energy and water quality issues and recommends that the FAA fund scoping studies on each of these areas. The FAA should also increase research funding to address particulate matter and hazardous air pollutants issues that are serious impediments to capacity growth. The FAA should also assess all of its environmental investments and determine an appropriate balance between near term mitigation activities and research.

Issue 3: Partnerships

The subcommittee noted that the FAA has a number of critical strategic partnerships to address environmental issues. There is a need to carefully consider the potential benefits of these activities and focus resources on high payoff opportunities.

Recommendation:

The Administrator should direct the Office of Environment and Energy to work with the Partnership for AiR Transportation Noise and Emissions Reduction (PARTNER) Center of Excellence to strengthen its partnerships with domestic stakeholders and build new linkages with international partners. The FAA should also increase its involvement in the Intergovernmental Panel on Climate Change processes, with the goal of ensuring that the best science informs decisions. Finally, the FAA needs to expand education, communication, and outreach strategies

to communicate the breadth of its efforts mitigating aviation's environmental impact to stakeholders. The FAA should also define metrics to measure success in such an endeavor.

Subcommittee on Air Traffic Services

Reducing separations standards is an important element of achieving increased NAS capacity, especially in terminal airspace. Two principal elements of required interaircraft separation, navigation accuracy and surveillance capability, have improved markedly since the current separation standards were established. It is important to understand how these improvements, plus other technology advances, can lead to a decrease in required interaircraft separation without any derogation of safety.

Recommendation:

Establish a working group which will examine the basis for current separation standards, review past and ongoing studies of separation requirements, and outline a recommended R&D program for the FAA to determine to what degree separation standards can be reduced using current technologies.

It is expected that this Working Group effort will require five or six one to two day meetings over a period of six months, and will culminate in a written report to the FAA via the REDAC.