THE NATIONAL ACADEMIES
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Aeronautics and Space Engineering Board News

Welcome to the latest installment of the ASEB News! This newsletter will update you on ASEB events and activities, as well as policy items of interest to the aerospace community.

Inside this issue:

New Report Assesses NASA's Aviation Safety-Related Programs

On July 19 the ASEB's congressionally-requested Committee for the Review of NASA's Aviation Safety-Related Research Programs released its final report, *Advancing Aeronautical Safety: A Review of NASA's Aviation Safety-Related Research Programs*. This review assessed whether the programs have well-defined, prioritized, and appropriate research objectives; whether resources have been allocated appropriately among these objectives; whether the programs are well coordinated with the safety research programs of the Federal Aviation Administration (FAA); and whether suitable mechanisms are in place for transitioning the research results into operational technologies and procedures and certification activities in a timely manner. NASA's aviation safety-related research is predominantly pursued through its Aeronautics Research Mission Directorate (ARMD).

Overall, the committee determined that NASA's aeronautics research enterprise has made, and continues to make, valuable contributions to aviation system safety, but it is falling short and needs improvement in some key respects. The committee's key findings are given below.

Do NASA's Safety-Related Research Programs Have Well-Defined, Prioritized, and Appropriate Research Objectives?

Findings: NASA needs a more objective process for prioritizing safety research. While the objectives of ARMD's Aviation Safety Program are worthy guideposts for safety research, ARMD lacks a well-founded process for prioritizing the research needs associated with each objective, and thus for ensuring that its research is well aligned with meeting critical national aviation safety needs. Internal interests are overemphasized in the programming of safety research. ARMD gives undue weight to research that aligns well with its existing activities, personnel, and assets rather than the results of critical evaluations of current and emerging aviation safety needs.

A copy of the aviation safety report can be purchased, or downloaded as a PDF document for free, from <http://www.nap.edu/catalog.php?

Have Resources Been Allocated Appropriately to Research Objectives?

Findings: Too few resources are devoted to sustaining and acquiring critical safety research capabilities. Continued emphasis on preserving existing research expertise and assets risks degradation of ARMD's core safety research strengths and the prolonged neglect of competencies

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From the Chair: New Technology for a New NASA

Raymond S. Colladay

The ASEB is forming study committees to undertake as many as seven new studies, all potentially starting in the next few months and running through 2011 and, for some, into 2012. See page 8 for a list and description.

One study now getting underway is to define technology roadmaps for NASA's Office of the Chief Technologist. For years, a number of ASEB and other NRC reports have recommended a priority be placed on restoring the NASA advanced space technology research and development investment. The following article, published on September 22 in *Space News*, is an expression of the importance of this technology investment, written from my personal perspective and that of Bill Ballhaus, who co-authored the Op-Ed piece.*

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If we really want a new NASA to lead the U.S. beyond the post-Apollo, Shuttle/ISS era, moving beyond low-Earth orbit with human exploration of the solar system, then an advanced space technology program must be the cornerstone of the foundation upon which a 'new NASA' is built. And it needs to be put in place now. It takes years of steady, robust funding, especially after years of neglect, to build a culture of innovation and collaboration among science and engineering talent in NASA, universities, and industry that attracts creative risk-taking to achieve the technology advances that can transform the agency across the breadth of its mission and insure continued U.S. leadership in space.

The President's budget request for NASA included the necessary funds to begin rebuilding the technology base for the future. Now, hopefully, the Congress will get on the same page with the Administration where it comes to putting a priority on advanced space technology R&D. Virtually every relevant report of the National Academies, the Augustine Committee, and the NASA Advisory Council has recommended it. NASA took an important step in establishing the Office of the Chief Technologist to manage space technology R&D independent of the major engineering development projects, but answerable to the stakeholder users. This is the best way to manage the creative tension between advances promoted by those pushing technology breakthroughs and innovative concepts and technology pulled by needs foreseen by the mission directorates, but not yet fully defined by firm requirements. An independent space technology R&D program in the Office of the Chief Technologist and an adequately funded technology maturation and transition effort in the user mission organizations—represented for exploration by the flagship demonstrations in the budget request—form elements of a robust technology R&D enterprise.

There are many examples of game-changing breakthroughs that started by asking 'what-if' questions about enabling technology before there ever was a requirement. Transformational technology that led to stealth aircraft, ubiquitous GPS applications, the Internet, heavy lift propulsion for the Saturn booster, are just a few such examples from the past. All were championed by science and engineering talent working on advanced technology R&D asking what if a breakthrough could be achieved to accomplish something that has never been done or tried before?

Given the President's requested budget for advanced space technology, the new Office of the Chief Technologist can help rekindle the same culture for a new NASA. Imagine a future enabled by computational design of materials to achieve desired properties by molecular manufacturing for a factor of 10 reduction in dry spacecraft weight; spacecraft-on-a-chip for

"...an advanced space technology program must be the cornerstone of the foundation upon which a 'new NASA' is built."

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*This article was originally published in the September 22, 2010 issue of *Space News* and was authored by Raymond Colladay and William Ballhaus. The NRC did not participate in its development or publication.

From the Chair: New Technology for a New NASA

(Continued from page 2)

Earth observation or other space applications; advanced in-space propulsion using nuclear powered magnetoplasmadynamic propulsion that could reduce long-distance exploration of the solar system to a fraction of today's transit times; synthetic biology that enables fabrication of biologically-inspired systems at incredibly high rates, initiated from a handful of genetically-engineered cells that could revolutionize approaches to in-space resource utilization; stellar spacecraft constructed of materials that could be reclaimed, separated, and re-formed into new components using low energy onboard manufacturing processes that morph and readapt form, fit, and function over century-long missions; and reliable, operable systems that provide space lift at one tenth of today's cost. Or for nearer term payoff, imagine being able to maneuver into orbit around other planets in our solar system with simpler, more capable spacecraft structures using aerocapture instead of propulsive- or aero-breaking; or lighter weight launch vehicles and propellant depots in space using large-scale cryogenic composite technology replacing today's aluminum propellant tanks; or being able to accommodate huge data files and very high download rates for space-based environmental measurements using optical communications and other extremely high bandwidth technology.

"There are many examples of game-changing breakthroughs that started by asking 'what-if' questions about enabling technology before there ever was a requirement."

These are just a few example technologies that along with many other such advances could transform NASA and the U.S. space program to once again be an engine for innovation, providing technology solutions that benefit society on Earth; creating quality, high-tech jobs that help drive the economy; and inspiring science, technology, engineering, and mathematics education. There will never be a 'new NASA' pursuing new frontiers with old technology—only a refinement and improvement on what we have done before. We can leave the refining and improving of past achievements to others while NASA takes the U.S. on a new path of leadership.

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Since NASA does not yet have an appropriation bill, the resources that will be available to aggressively pursue cutting-edge technology to help transform NASA are not yet known. The NASA Authorization Act of 2010 rolls back the Administration's requested level of funding for space technology.

All seven of the anticipated studies mentioned have a chance to make a significant impact on the aerospace programs and priorities for which they are designed to address.

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ASEB Calendar—Winter 2011

December 13-15, 2010	Orbital Debris Committee Meeting 1: Washington, DC
January 5-7, 2011	Human Spaceflight Crew Operations Committee Meeting 1: Houston, TX
April 5-7, 2011	ASEB Spring Meeting (Joint with SSB): Washington, DC

For updates to the ASEB calendar, please see http://www.national-academies.org/aseb

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Director's Corner

Michael Moloney

Since April, it has been a busy 7 months with my taking on the role of director of the Aeronautics and Space Engineering Board. It is in some ways a daunting task, but moreover it is an exciting prospect. It is a role for which my 10 years at the Academies as a study director has well prepared me. But I am also in good stead, owing to the legacy of the excellent tenure of Dick Rowberg as interim director and of the outstanding jobs done by Marcia Smith and her predecessors.

On behalf of the whole staff of the ASEB, I want to express my deep gratitude to Dick for steering the ASEB ship so ably for the last year, a task he took on in addition to his duties at our parent division. The ASEB is all the better for his careful stewardship of both the staff and the healthy portfolio of studies underway and promised in the short term.

My new task as Board director is all the more pleasant because of the excellent corps of program and administrative staff that Dick and his predecessors have established. It is also a particularly pleasant prospect to be working with the ASEB chair Ray Colladay and the Board's membership. I will benefit greatly from the guidance, expertise, and professional judgment of our ASEB members. Their expertise is well recognized in Washington and beyond as the foundation of our reputation and success.

Since the Spring we have been preparing for and initiating a portfolio of new studies. The largest of these is a study for NASA's Office of the Chief Technologist (OCT). This activity will involve appointing a steering committee and up to seven panels to solicit external inputs to and evaluate the 14 draft technology roadmaps that NASA is in the process of developing. The study committee will also provide recommendations that identify and prioritize key technologies. The scope of the technologies to be considered includes those that address the needs of NASA's exploration systems, Earth and space science, and space operations mission areas, as well as those that contribute to critical national and commercial needs in space technology. The committee and panels will meet in early 2011 and the final report will be issued about a year later. In addition to this study, the ASEB is initiating a study on NASA's orbital debris program and a study to review of the human spaceflight crew office. Our final new activity for NASA is on the aeronautics side and involves a review of NASA's flight research program. This study follows the Board's visit to the Dryden Research Center in September, where the Board heard an excellent set of briefings on NASA's ongoing research and, even more interestingly, got some hands-on demonstrations of the center's research. While at Dryden, we also took the opportunity to cross the desert around Edwards Air Force Base to visit a number of installations at the Air Force Research Laboratory. All in all a great trip for which the Board and staff are in debt to our hosts at NASA and the Air Force.

All the new study activities are described in greater detail within this newsletter as are the results from our most recent report releases. It is certainly going to be a busy 2 years for the ASEB, our committee volunteers, and its staff. Stay tuned.

Michael H. Moloney
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New Report Assesses NASA's Laboratory Capabilities

Over the past 5 years, there has been a steady and significant decrease in the laboratory capabilities for fundamental research of NASA, including equipment, maintenance, and facility upgrades. Since NASA's laboratories are a critical component of its research capabilities, this deterioration jeopardizes NASA's ability to achieve its future goals. The NASA Laboratory Capabilities report, the result of a directive from the NASA Authorization Act of 2008, was released on May 11, 2010 and describes the extent to which NASA's laboratories are currently equipped and maintained to support NASA's fundamental research capabilities. The project was led by the Laboratory Assessments Board in collaboration with the Space Studies Board and the ASEB.

Since the mid-1990s, changes in NASA's administration of investments and management and accounting systems have had an adverse impact on funding for laboratory equipment and support services. Specifically, they have resulted in a loss of stable funding to support the labor needed to achieve long-term objectives and a drop in funding assigned to projects with lower technology readiness levels. As a result, research has been deferred as researchers expend an increasing proportion of their time seeking funding.

The institutional capabilities of the NASA centers, including their laboratories, have taken years to develop and depend very strongly on highly competent and experienced personnel and the infrastructure that supports their research. Such capabilities can be destroyed in a short time if not supported with adequate resources, including the ability to hire new personnel to learn from those who built and nurtured the laboratories. Capabilities, once destroyed, cannot be reconstituted rapidly at will. Therefore, it is important that the potential impacts of funding decisions on labor continuity and maintenance of facilities be carefully considered. The committee considered four topic areas:

1. Facility and Equipment Quality and Support Services. On average, the committee classified the facilities and equipment devoted to fundamental research observed in the NASA laboratories as marginally adequate, with a downward trend in quality in recent years. NASA is not providing sufficient laboratory equipment and support services to address immediate or long-term research needs and is increasingly relying on the contract technician workforce to support the laboratories and facilities. This report recommends that the equipment and support services needed to conduct high-quality fundamental research be provided to NASA's research community.

2. Facility Maintenance and Safety. The facilities that house fundamental research activities at NASA are typically old and require more maintenance than funding permits. Research laboratories are crowded and often lack the modern layouts and utilities that improve operational efficiency. This can lead to safety issues, particularly with large, high-powered equipment. To address these concerns, NASA should find a solution to its deferred maintenance issues before catastrophic failures occur that will seriously impact missions and research operations. Because maintenance resources are limited, NASA should implement predictive-equipment-failure processes currently used by many organizations.

3. Basic Research Funding. The funding of basic or fundamental research at NASA has declined dramatically in recent years. Unless corrective action is taken soon, the agency's fundamental research community will be unable to support its long-term goals. To improve the health of its facilities, NASA should restore a better funding and leadership balance between long-term fundamental research and technology development and short-term mission-focused applications. NASA must increase resources to its aeronautics laboratories and facilities to attract and retain the best and brightest researchers if it is to remain on par with international aeronautical research organizations.

4. Comparison with Other Research Facilities. Based on the experience and expertise of its members, the committee believes that the equipment and facilities at NASA's basic research laboratories are inferior to those at comparable DOE laboratories, top-tier universities, and corporate research laboratories. The quality of NASA basic research facilities is similar to that at Department of Defense research laboratories. The committee recommends that NASA improve the quality and equipping of its basic research facilities to make them comparable to academic, industry, and governmental facilities in order to maintain U.S. leadership in the space, Earth, and aeronautic sciences and to attract the talented researchers needed for the future.

A copy of the NASA laboratory capabilities report can be purchased, or downloaded as a PDF document for free, from <http://www.nap.edu/catalog.php?record_id=12903>.

Where's the executive summary?

Looking for a more extended summary of one of our reports? On the report's page on the National Academies Press website (such as <http://www.nap.edu/catalog.php?record_id=12202>), scroll down a little bit to a section called "Free Resources." There, in a box titled "Download Free," you will see a link called "PDF Summary." Click the link to download the full executive summary in PDF format.

Where's the report?

Each of our reports is also available in its entirety in PDF format from the National Academies Press website. Each report highlighted in this newsletter has its corresponding NAP website listed (such as <http://www.nap.edu/catalog.php?record_id=12202>). On the report's page, click on the button that says "Sign in to download free PDFs" and follow the instructions to download the full report.

You can browse or search the NAP website at <http://www.nap.edu> for other ASEB titles.

Interim Report Assesses Life and Physical Sciences Research in Space

The Committee for the Decadal Survey on Biological and Physical Sciences in Space is conducting a study to establish priorities and recommendations for life and physical sciences research in microgravity and partial gravity for the decade 2010-2020. During the period of the decadal survey's development, NASA was directed to extend the lifetime of the International Space Station (ISS) to 2020. An interim report was released in August 2010 to provide timely input to the ongoing reorganization of programs related to life and physical sciences microgravity research, as well as to near-term planning or replanning of ISS research. Although the development of specific recommendations is deferred until the final report, this interim report does attempt to identify programmatic needs and issues to guide near-term decisions that the committee has concluded are critical to strengthening the organization and management of life and physical sciences research at NASA. This report also identifies a number of broad topics that represent near-term opportunities for ISS research.

Programmatic Issues for Strengthening the Research Enterprise

As the result of major reorganizations and shifting priorities within the past decade at NASA, there is currently no clear institutional home within the agency for the various scientific endeavors that are focused on understanding how biological and physical systems behave in low-gravity environments. As NASA moves to rebuild or restructure programs focused on these activities, it will have to consider what elements to include in that program. Critical needs for a successful renewed research endeavor include:

- Elevating the priority of research in the agenda for space exploration;
- Selecting research likely to provide value to an optimal range of future mission designs;
- Developing a comprehensive database that is accessible to the scientific community;
- Implementing a translational science component to ensure bidirectional interactions between basic science and the development of new mission options; and
- Encouraging, and then accommodating, team science approaches to what are inherently complex multidisciplinary challenges.

In addition, as noted repeatedly by the scientific community that has provided input to this study, reasonable stability and predictability of research funding are critical to ensuring productive and sustained progress toward research goals in any program.

ISS Research Opportunities

The ISS provides a unique platform for research, and past studies have noted the critical importance of its research capabilities to support the goal of long-term human exploration in space. Although it is difficult to predict the timing for the transition of important research questions from ground- to space-based investigations, the committee identifies in this interim report a number of broad topics that represent near-term opportunities for ISS research. These topics, which are not prioritized, fall under the following general areas:

- Plant and microbial research to increase fundamental knowledge of the gravitational response and potentially to advance goals for the development of bioregenerative life support;
- Behavioral research to mitigate the detrimental effects of the spaceflight environment on astronauts' functioning and health;
- Human and animal biology research to increase basic understanding of the effects of spaceflight on biological systems and to develop critically needed countermeasures to mitigate the negative biological effects of spaceflight on astronauts' health, safety, and performance;
- Physical sciences research to explore fundamental laws of the universe and basic physical phenomena in the absence of the confounding effects of gravity; and
- Translational and applied research in physical sciences that can provide a foundation of knowledge for the development of systems and technologies enabling human and robotic exploration.

A copy of the Life and Physical Sciences in Space interim report can be purchased, or downloaded as a PDF document for free, from <http://www.nap.edu/catalog.php?record_id=12944>.

Board members and staff talk to NASA personnel about the agency's Ikhana aerial drone, a modified version of the Predator aircraft used by the U.S. Air Force.

The HL-10 lifting body aircraft tested in the 1960s. It now guards the gate to the Dryden Flight Research Center.

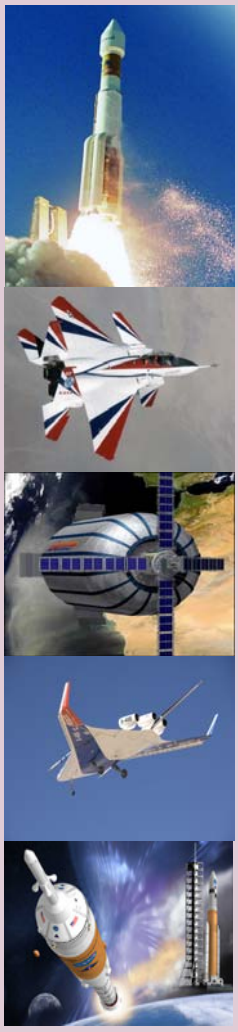
The Fall ASEB Meeting, NASA Dryden Flight Research Center, September 29—October 1, 2010

ASEB chair Ray Colladay emerging from a Gulfstream jet being modified by NASA for flight tests.

A modified F-8 fighter used for NASA's Supercritical Wing project. The aircraft is one of a number of retired flight test aircraft now located at the entrance to Dryden on Edwards Air Force Base.

ASEB Members in the Global Hawk control room at Dryden talking to operators of NASA's two Global Hawk uninhabited aerial vehicles. Behind the operators' control room is the science instrument control room for the aircraft. NASA recently used a Global Hawk to fly over a hurricane in the Atlantic Ocean after launching from Dryden in California.

Committee News



NASA Technology Roadmap Study. The 2011 NASA Authorization Bill initiates a new NASA innovation and technology program. This program, called the Space Technology program, will be managed by the Office of the Chief Technologist, and it will foster the development of advanced technologies and concepts that address NASA's needs and contribute to other national space applications. The NRC is in the process of appointing a steering committee and seven panels that will evaluate and recommended improvements to 14 draft roadmaps that NASA has prepared and to prioritize the technologies contained therein. ASEB Chair Ray Colladay will be chairing the steering committee for this effort.

Decadal Survey on Biological and Physical Sciences in Space. This congressionally-mandated study will establish priorities and provide recommendations for life and physical sciences research in microgravity and partial gravity for the 2010-2020 decade. A steering committee and seven topical panels were formed to address this task. An interim report has already been released (see p. 6), and a final report is expected to be released in early 2011. This study is being conducted jointly with the Space Studies Board.

Spaceflight Crew Operations. The NRC has been asked by NASA to conduct an assessment of the Spaceflight Crew Operations office. The committee will address the following questions:

1. How should the role and size of the activities that are managed by the human spaceflight crew office change following space shuttle retirement and completion of the assembly of the International Space Station (ISS)?
2. What are the requirements of crew-related ground facilities after the space shuttle program ends?
3. Is the astronaut corps' fleet of training aircraft a cost-effective means of preparing astronauts for the requirements of NASA's human spaceflight program? Are there more cost-effective means of meeting these training requirements?

A committee of 15 members has been approved by the NRC; the co-chairs for this study are Fred Gregory and Joe Rothenberg. The committee's first meeting will be in Houston in January, with anticipated delivery of a report by August.

Flight Research Operations. The ASEB has been asked by NASA to conduct a study of aeronautics flight research activities at NASA.

Specifically, the committee will undertake the following tasks:

- Within the set of goals and challenges being addressed by NASA's Aeronautics Research program, identify those challenges where research program success can be achieved most effectively through flight research;
- Identify any goals and challenges in the NASA Aeronautics program that may be limited due to an anticipated lack of available flight research capability;
- Review the current portfolio of NASA's flight research activities and the flight research needs of NASA's aeronautics program and identify programmatic and research requirements gaps;
- Review the capabilities and limitations of the current fleet of NASA aeronautics research aircraft in terms of their ability to meet the above requirements and gaps;
- Consider how the research opportunities might be pursued in an economical, affordable, and technically rigorous way; and
- Recommend how NASA might maintain a robust flight research program within defined budget scenarios.

We are currently seeking recommendations for possible candidates to serve on an approximately 12-person committee in the following areas: aeronautics, next generation air transportation systems, aerodynamics, propulsion, flight testing and flight research, modeling and simulation, systems engineering and integration, aviation safety, federal program management and budgeting, and government-private partnerships. After a committee is nominated, we expect to hold a first meeting in February 2011 at Dryden Flight Research Center.

Orbital Debris. This winter, the ASEB will be putting together a committee to review NASA's Micrometeoroid and Orbital Debris programs. For the past

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two decades, NASA has built a robust program to evaluate and limit the generation of orbital debris and the risk to NASA spacecraft associated with debris and micrometeoroids. NASA's programs are recognized worldwide, yet with the growth of orbital debris over the past few years, NASA recognizes the responsibility to use their capabilities and assets to support not just NASA needs, but also to support, as a national resource, other national and international debris and micrometeoroid activities. In the 1990s, the ASEB generated foundational studies of these issues, and now NASA has asked the ASEB to form a committee to examine NASA's programs and provide guidance on any additional areas in which NASA should be devoted its resources. The study will be chaired by Don Kessler, and the first meeting is to be held on December 13-15, 2010, in Washington, DC.

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Meetings of Experts

Verification and Validation for Flight Critical Systems Meeting of Experts

The NRC hosted a meeting of experts for NASA on Verification and Validation for Flight Critical Systems (VVFCS) on July 8, 2010. The panel of eight experts, chaired by Jim Krodel of Pratt &Whitney, heard presentations from NASA's aviation safety research team in four topic areas: argument-based safety assurance, integrated distributed systems, authority and autonomy, and software intensive systems. The experts then offered feedback on the proposed research plans. The meeting was well attended by NASA's representatives and by interested members of the aviation industry.

Unmanned Aircraft Systems (UAS) Meeting of Experts

The NRC hosted a meeting of experts for NASA on Integration of Unmanned Aircraft Systems into the national air transportation system on August 5, 2010. The panel of 17 experts, chaired by John Hansman of MIT, heard presentations from NASA managers and researchers in four primary topic areas: separation assurance and collision avoidance, pilot-aircraft interface, communications, and certification. The experts then offered feedback on the proposed research plans. The meeting drew approximately 80 attendees, representing views ranging from the aviation industry, government (including defense interests), and academia.

Aviation Safety Report

(Continued from page 1)

required to address new and emerging safety issues. Too few resources and programs are devoted to stimulating innovation. ARMD lacks the structure to elicit, explore, and develop innovative ideas to advance aviation safety.

Are the Programs Properly Coordinated with the Safety Research Programs of the FAA and Other Relevant Federal Agencies?

Findings: Connections with the FAA, other federal agencies, and the aviation community are varied but not deep. NASA and the FAA coordinate in the planning and conduct of safety research, and many mechanisms exist for interacting and exchanging information with other federal agencies, academia, and industry. These connections could be deepened through more inclusive and sustained reviews of NASA safety research by such outside experts. Internal coordination of and collaboration on safety research need improvement. Within ARMD, there is stove-piping of research that risks system-level safety solutions not being explored and safety hazards not being addressed that arise from interactions among aviation system elements.

Do Suitable Mechanisms Exist for Transitioning the Research Results from the Programs into Operational Technologies and Procedures and Certification Activities in a Timely Manner?

Findings: Demands for safety-assured technologies and procedures can conflict with NASA's emphasis on long-range, foundational research. ARMD exploits many mechanisms to assist in furthering the technologies and procedures developed through its research; however, safety assurance and approval requirements can present vexing implementation challenges. In light of these challenges, some of ARMD's safety-related research would appear to have very limited prospects for eventual implementation—a risk that deserves more explicit consideration when ARMD programs its research.

To address these shortcomings, the committee recommended several actions that could be pursued by NASA:

Recommendation 1: ARMD should adopt a more fully informed, empirical, and documented process for identifying and prioritizing safety research needs for use in guiding its aeronautics research and development programming and investments in research expertise and capacity. A central element of this process should be the development of comprehensive aviation safety needs assessments.

Recommendation 2: ARMD should establish programmatic means for encouraging more exploratory research on innovative ideas to improve aviation safety. The program should elicit and develop the promising ideas of researchers from industry, academia, other government agencies, and NASA.

Recommendation 3: ARMD's safety-related research activities should be subject to regular reviews by outside experts from the Federal Aviation Administration and other government agencies, industry, independent research institutes, and universities. These reviews, which will help in ensuring continued safety relevance, quality, implementation challenges, and successful transitioning, should be undertaken during the formative stages of the research, interim phases, and as the work is being completed. The reviews should have a prominent role in informing research programming decisions.

Recommendation 4: ARMD should develop and implement processes that will lead to more coordination and collaboration in the planning and conduct of safety research both within the Aviation Safety Program and across all its aeronautics research programs.

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The ASEB's sister Board, the Space Studies Board (SSB), also publishes a newsletter; visit http://sites.nationalacademies.org/SSB/ssb_052298 to subscribe or to view past SSB newsletters. The ASEB's division, the Division on Engineering and Physical Sciences (DEPS), also publishes a newsletter; visit http://sites.nationalacademies.org/DEPS/DEPS_059299 to subscribe.

About Us...

The Aeronautics and Space Engineering Board (ASEB) was established in 1967 "to focus talents and energies of the engineering community on significant aerospace policies and programs." In undertaking its responsibility, the ASEB oversees ad hoc committees that recommend priorities and procedures for achieving aerospace engineering objectives and offers a way to bring engineering and other related expertise to bear on aerospace issues of national importance.

The majority of ASEB studies originate with the National Aeronautics and Space Administration (NASA), particularly the Aeronautics Research Mission Directorate and the Exploration Systems Mission Directorate. Some of these studies are requested by Congress in related legislation. ASEB also conducts proposal reviews for the State of Ohio's Third Millennium Program through the Ohio Department of Development, and identifies experts to assist the Government Accountability Office in conducting its studies. The ASEB also has performed technical and policy studies for the Nuclear Regulatory Commission, the Defense Nuclear Agency, the Federal Aviation Administration, the National Science Foundation, the Defense Threat Reduction Agency, Air Force Space Command, the Air Force Office of Scientific Research, the National Oceanic and Atmospheric Administration, and others.