AERONAUTICS AND SPACE ENGINEERING BOARD (ASEB)

The ASEB was established in 1967 to focus talents and energies of the engineering community on significant aerospace policies and programs. In undertaking its responsibilities, 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. Among these issues are the research and development (R&D) aspects of the Next Generation Air Transportation System (NextGen); the National Aeronautics and Space Administration’s (NASA’s) aeronautics research program; national aeronautics R&D policy and its implementation; space policy and programs, with a focus on human spaceflight and space operations; commercial space activities; and other aerospace engineering topics.

Selected Recent Reports

NASA’s Strategic Direction and the Need for a National Consensus (2012)

NASA is widely admired for astonishing accomplishments since its formation in 1958. Looking ahead over a comparable period of time, what can the nation and the world expect of NASA? What will be the Agency’s goals and objectives, and what will be the strategy for achieving them? More fundamentally, how will the goals, objectives, and strategy be established and by whom? How will they be modified to reflect changes in science, technology, national priorities, and available resources? In late 2011, the U.S. Congress directed the NASA Office of Inspector General to commission a “comprehensive independent assessment of NASA’s strategic direction and agency management.” Subsequently, NASA requested that the NRC conduct this independent assessment. In the spring of 2012, the NRC Committee on NASA’s Strategic Direction was formed and began work on its task. The committee determined that, only with a national consensus on the Agency’s future strategic direction—along the lines described in the full NRC report—can NASA continue to deliver the wonder, the knowledge, the national security and economic benefits, and the technology that have been typified by its earlier history.

Reusable Booster System: Review and Assessment (2012)

On June 15, 2011, the Air Force Space Command established a new vision, mission, and set of goals to ensure continued U.S. dominance in space and cyberspace mission areas. Subsequently, and in coordination with the Air Force Research Laboratory, the Space and Missile Systems Center, and the 14th and 24th Air Forces, the Air Force Space Command identified four long-term science and technology challenges critical to meeting these goals. One of these challenges is to provide full-spectrum launch capability at dramatically lower cost, and a reusable booster system (RBS) has been proposed as an approach to meet this challenge. This report reviews and assesses the criteria and assumptions used in the current RBS plans, the cost model methodologies used to frame the RBS business case, and the technical maturity and development plans of key elements critical to RBS implementation.


The U.S. Air Force is the primary U.S. government organization tasked with maintaining the space object catalog and data on all space objects. This is a complicated task, involving collecting data from a multitude of different sensors—many of which were not specifically designed to track orbiting objects—and fusing the tracking data along with other data, such as data from atmospheric models, to provide predictions of where objects will be in the future. Preventing collisions of space objects, regardless of their ownership, is in the national security interest of the United States. This report makes recommendations to the AFSPC in order for it to create and expand research programs, design and develop hardware and software, as well as determine which organizations to work with to achieve its goals.

Recapturing NASA’s Aeronautics Flight Research Capabilities (2012)

Aeronautics research does not follow a linear path from simulation to wind tunnels to flying an aircraft. The loss of flight research capabilities at NASA has therefore hindered the Agency’s ability to make progress throughout its aeronautics program by removing a primary tool for research. This report discusses the motivation for NASA to pursue flight research, addressing the aspects of the committee’s task such as identifying the challenges where research program success can be achieved most effectively through flight research. It describes issues with the NASA ARMD organization and management and offers solutions. In addition, it reviews current impediments to progress, including demonstrating relevancy to stakeholders, leadership, and the lack of focus relative to available resources.

NASA’s Office of the Chief Technologist (OCT) has begun to rebuild the advanced space technology program in the Agency with plans laid out in 14 draft technology roadmaps. However, success in executing future NASA space missions will depend on advanced technology developments that should already be underway. Reaching out to involve the external technical community, the NRC considered the 14 draft technology roadmaps prepared by OCT and ranked the top technical challenges and highest-priority technologies that NASA should emphasize in the next 5 years. This report provides specific guidance and recommendations on how the effectiveness of the technology development program managed by OCT can be enhanced in the face of scarce resources.

Limiting Future Collision Risk to Spacecraft: An Assessment of NASA’s Meteoroid and Orbital Debris Programs (2011)

Rising concerns about meteoroids and orbital debris, which put spacecraft and astronauts in potential danger, have prompted decision-makers to look into strategies for lessening the hazard they pose. Derelict satellites, equipment, paint fragments, and other debris orbiting Earth—also called “space junk”—have been accumulating over many decades and could significantly damage, or even possibly destroy, satellites and human spacecraft if they collide. In 2010, NASA asked the NRC to evaluate the programs within the agency responsible for addressing meteoroids and orbital debris. This report examines NASA’s efforts to understand the meteoroid and orbital debris environment, what NASA is and is not doing to mitigate the risks posed by this threat, and how they can improve their programs.

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