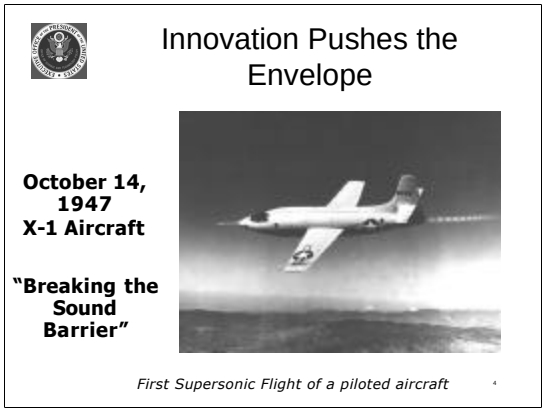
Thank you so much, Dr. Russo, for your kind introduction. It is such a privilege to be here today. I would certainly like to commend AIAA and ICAS for putting on such a remarkable event. The week's sessions have showcased how talented, visionary, and passionate the Aerospace community can be. The legacy of a 100 years in air and space is one we can all be proud of.

Let me read to you from the President's proclamation that kicked off the 100th anniversary of flight, "Throughout our Nation's history, Americans have contributed to important technological breakthroughs that have improved the quality of life for countless individuals. On December 17, 1903, near Kitty Hawk, North Carolina, Orville and Wilbur Wright achieved the first successfully sustained and controlled flight with a heavier-than-air, engine-powered aircraft. In a year where we celebrate the 100th anniversary of this revolutionary event, we honor the vision and determination of these innovators whose remarkable achievements changed the world forever."

The International Air and Space Symposium and Exposition, here in the birthplace, home, and future of Aerospace, Dayton, Ohio, the Wright Brothers' home town where they drew up the plans for their flying machine, refined their invention, and ultimately redefined the globe through aviation is a fitting tribute to that 100 year legacy.

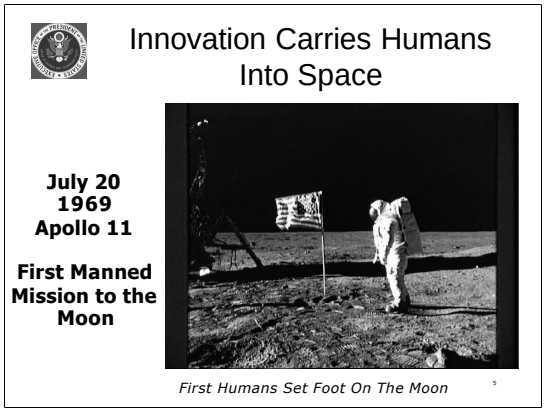
Following the Wright Brother's achievement, U.S. and European innovators continued to develop the underlying technology necessary to launch a new industry. By 1935, when the Douglas Aircraft company introduced the DC-3, a whole new segment of the population started to use air transportation as a normal way of traveling.

Interestingly enough, the DC-3 flew for the first time on December 17, 1935, exactly 32 years after the first flight of the Wright brothers.



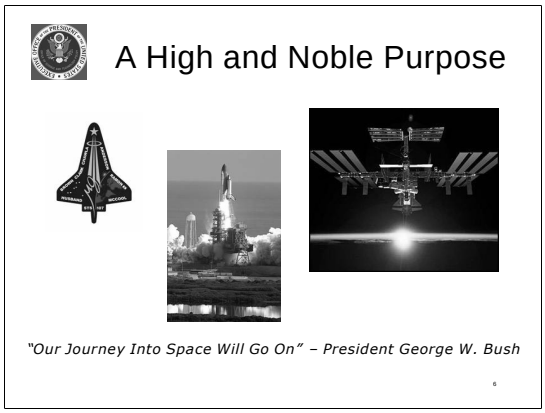
Technological innovation in Aeronautics continued to add to a history of first-ever achievements when on October 14, 1947, with USAF Captain Chuck Yeager as pilot, the X-1 made the first supersonic flight by a piloted aircraft.

Up until that time, there was widespread speculation that an invisible "sound barrier" might block the path to increasing airspeed. Since no one had ever flown faster than sound, this was at least considered plausible. It is hard today, given that supersonic flight is so commonplace, to appreciate the anxieties surrounding this issue in the late 1940's. The fact that it is commonplace today is another example of how far technology has advanced.



And one cannot discuss some of the greatest achievements resulting from U.S. technological innovation without highlighting the Apollo 11 mission, when at 10:56 pm on July 20, 1969, Neil Armstrong became the first human to set foot on the Moon. In his own immortal words, it was truly "one small step for man, one giant leap for mankind.“

It is such an honor to have Mr. Armstrong here with us today.



As we gather this week, in a year we celebrate 100 years of flight, we must not forget that this same year has also been touched by tragedy. Our spirit of innovation has not come without great cost. We were all reminded of this fact when the Space Shuttle Columbia was destroyed in the skies over Texas last February.

From the earliest days of aviation, test pilots have risked their lives to fulfill a dream and to expand our understanding of the universe. We will not forget the men and women of Columbia who lost their lives this year, just as we honor those who have made the ultimate sacrifice to expand the frontiers of flight.

And while we don't know yet, in detail, how the Columbia accident will shape the future of space exploration, what is certain is that the U.S. will continue to explore space and that courageous and daring individuals will continue to travel beyond our planet to do so.

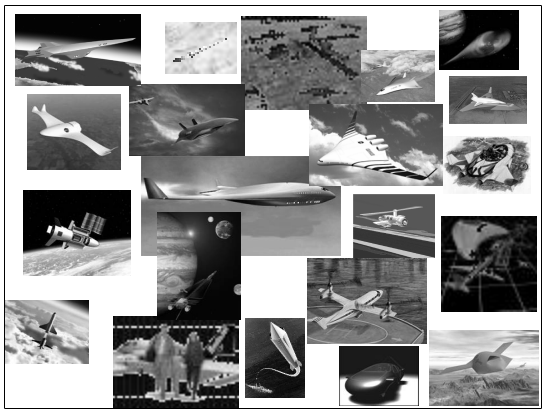
Today we continue to reach out into the universe in other ways and to expand our understanding of our own planet.

NASA's orbiting Hubble Space Telescope continues to bring us magnificent images every day, expanding our understanding of the universe.

NASA also recently launched two rovers to Mars ("Spirit" and "Opportunity") as part of a long-term effort of robotic exploration of the red planet.

The unique contributions of these technologies are helping us answer some age-old questions: How old is the universe? How big is it? What is its fate? Where did the planets, stars, and galaxies come from?

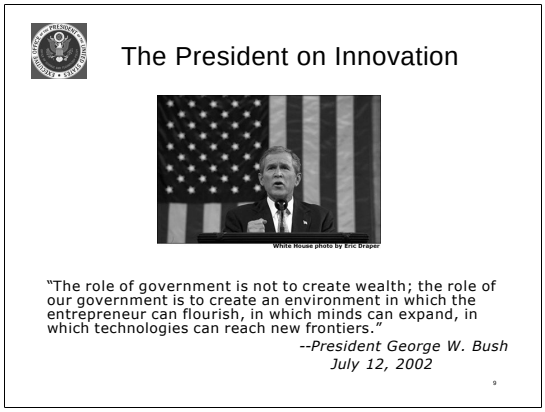
Seeking the answers to these questions, and finding them, is a continuation of the legacy left by aerospace pioneers.



This has been a very exciting week. I have enjoyed the glimpse into the myriad of possible futures you have all imagined. When we look back over the first century of flight and realize the progress that has been made, it is certainly intriguing to consider possibilities for the next century…

- Expanded use of Uninhabited Autonomous Vehicles (UAVs);
- Personal, airport-independent aircraft;
- Hypersonic speeds on a routine basis;
- Micro air vehicles that mimic the flight mechanisms of insects and birds;
- An optimized, secure, and safe air space system with unconstrained capacity;
- Access to space whenever we need it at a reasonable cost;
- And reaching farther and farther into our universe to continue our quest of knowledge of what is out there.

This symposium reaffirms that innovation in Aerospace begun by the Wright Brothers is alive and well 100 years later.



Our founding fathers shared an optimism about the power of individual creativity. U.S. philosophy rests on the belief that entrepreneurs – like the Wright Brothers – whether motivated by altruistic concerns, or personal ambition, or return on investment, are the ultimate source of economic strength.

So what role does the Federal Government play in facilitating innovation?

As the President has stated:

"The role of government is not to create wealth; the role of our government is to create an environment in which the entrepreneur can flourish, in which minds can expand, in which technologies can reach new frontiers."

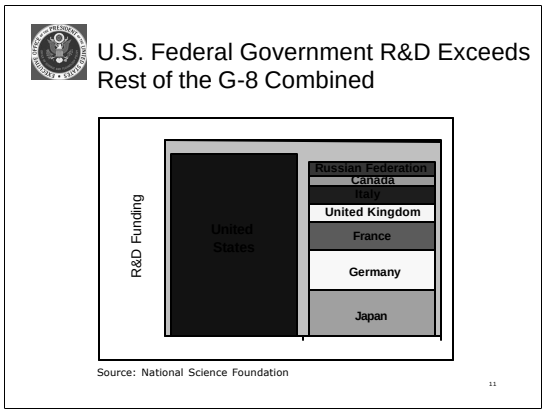
A critical part of creating that environment is federally sponsored R&D.

This Administration understands that research is the engine that drives technological innovation, and that technology in turn drives capabilities throughout the economy.

This Administration also understands that the Federal Government has a particular responsibility to invest in high-risk basic research. It is the results of this research that feeds into the work of the private sector and allows our nation to continue to be the most innovative the world has ever seen.

The U.S. Government will spend $123 Billion dollars on R&D as requested by the President during FY2004. This clearly underscores the priority the President places on technological innovation.

This level of funding represents a 7 percent increase over the previous year's request which is roughly twice the growth rate of the overall federal discretionary budget. In fact, the federal R&D budget will have grown 34% under President Bush's leadership increasing from $91 billion in FY2001.



The commitment is substantial. U.S. Federal Government R&D exceeds that of the rest of the G-8 countries combined.

As shown in the talks given in this symposium, there is no doubt that the underpinnings of today's science and technology research are blurring the distinction between scientific disciplines. The Biological, Physical, Engineering, and Information Technology worlds are merging at an incredible rate. And the federal R&D portfolio reflects this trend. Investments in many of these emerging, interdisciplinary areas will benefit multiple sectors. Aerospace applications in the future will be revolutionized by many of these fundamental innovations, just as we'll see this research revolutionizing areas such as computing, medicine, and energy.

Before I get into some specific priority areas within the federal research portfolio that will have a lasting impact on Aerospace, I'd like to note that we can look back over the last 100 years of basic research and see the impact it has had on advancing air and space capabilities.

As an example, the Defense Science Board released a report in 1998 that summarized some of the advances in military capabilities attributed to S&T research during the 20th century. Some examples are listed here.

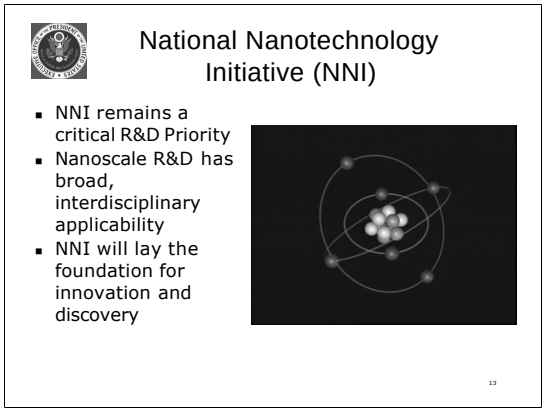
Aircraft speed has increased by a factor of 4 since 1950 while aircraft payload has grown 5 times. Weapons are now precise to within 1 foot (or better). And Radio Communications now span over 10,000 miles, a factor of over 20 times the range possible in the early 1900's.

Much of this growth in capability would not have been possible without R&D that was not initially aimed at aerospace applications.

For example, it was the development of the atomic clock that enabled researchers to create the Global Positioning System. These clocks were created by physicists seeking answers to basic questions about the nature of the universe. They had no notion that this would some day lead to a global system of navigation.

It is certainly hard to anticipate how aviation and space exploration will be shaped by today's research over the next century. Nonetheless, we can be confident that the fuel for future innovation does rest in the fundamental research being done today and that this research will play a pivotal role in transforming Aerospace.

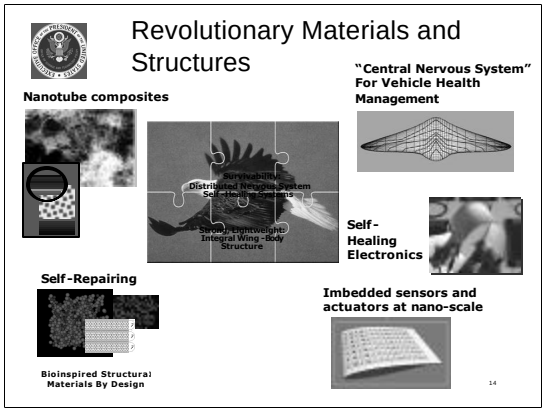
This is particularly true in three growing interdisciplinary fields: Nanotechnology, biomimetics and computational modeling.



The first priority research area I would like to highlight is nanotechnology. It isn't surprising that this conference emphasized nanotechnology research with a special session focused in this area. As this short animation demonstrates, understanding the fundamental building blocks for material design and assembly at the nanoscale holds out great promise. I borrowed it from NASA because it is a good illustration of how nanotechnology has the potential to transform Aerospace.

The goal pictured here is to develop high strength, adaptive aircraft structure that can morph to optimize its configuration, is self-diagnosing and self-healing. This goal may seem like an elusive one. However, the foundations for this capability are the focus of nanotechnology research today.

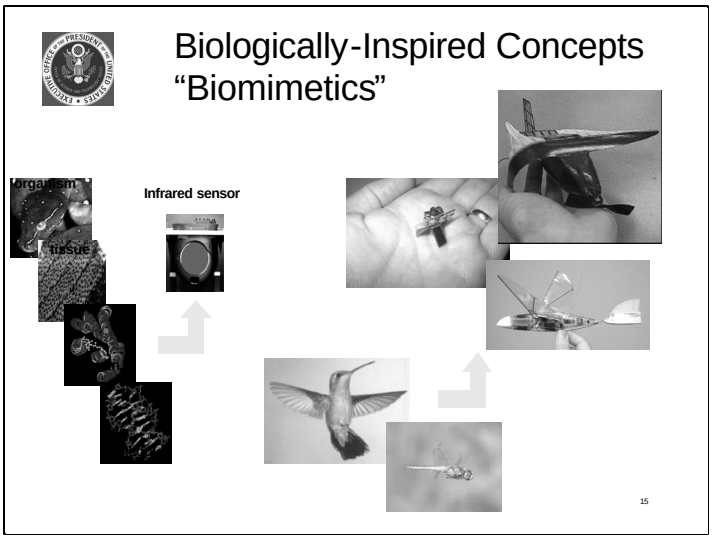
Nanotechnology holds great promise broadly across many scientific fields and most sectors of the economy. It is exactly the type of long lead, high risk-basic that is the responsibility of government. Which is why the President's FY2004 budget request provides nearly $850 million for NNI. That is up from $469m in 2001.



Let me give you a specific example of nano research with great applicability to aerospace.

This chart characterizes "nature-inspired" technology development. The Eagle is survivable in large part because of its distributed nervous system and its ability to heal. It is very strong and lightweight due to an integral wing-body structure.

NNI will provide researchers the ability to pursue the basic science and technology to understand how to mimic the characteristics that nature has evolved over millions of years. Advances in understanding fundamental science and engineering on the nanoscale are critical to the development of next generation components and systems.



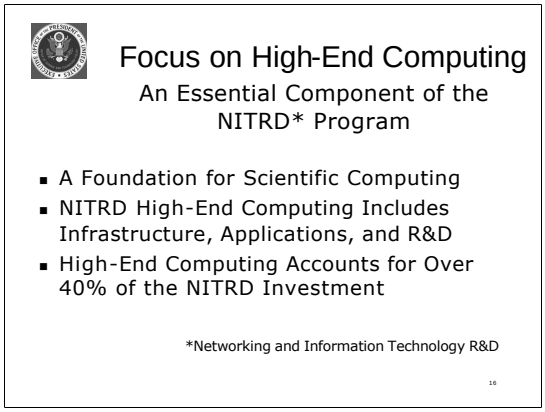
Nanotechnology is not the only field of research that offers us the possibility of fundamentally changing the way we will fly in the future.

Biomimetics R&D at NASA, DARPA, and the Air Force (and elsewhere) is also focused on applying what nature can teach us about technology.

We can extract basic knowledge about infrared sensors from creatures that have this innate capability.

We can also learn something about how to design micro-air vehicles from birds and insects that operate at very low Reynolds number and are dependent on unsteady aerodynamics.

These are also examples of interdisciplinary research where basic investigation of nanotechnology, biology and evolution will lead to significant advances in capability.

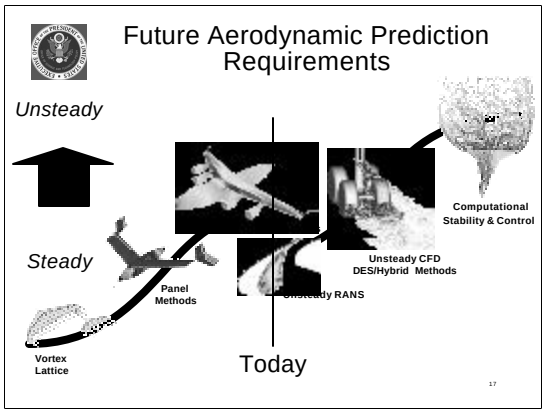


Also critical to our ability to implement new (and even radical) flight designs is computational modeling.

The Networking and Information Technology Research and Development (NITRD) Program is the federal research program that funds computational research. It is a priority for the Administration. In the President's FY2004 budget request, NITRD has grown by $411 million since 2001, bringing the overall annual investment to $2.2 billion.

A principle focus area of the NITRD program is on High-End Computing.

Design of Aerospace vehicles is of necessity a multi-disciplinary effort. Current capabilities to model such characteristics as the external airflow, propulsion performance, vehicle signature, and materials properties are relatively mature, at least for a well-behaved subset of conditions. However, the need to combine these independent modeling efforts to fully optimize vehicle designs and to address the growing need to model more complex biological and physical phenomena require huge advances in computing capability.



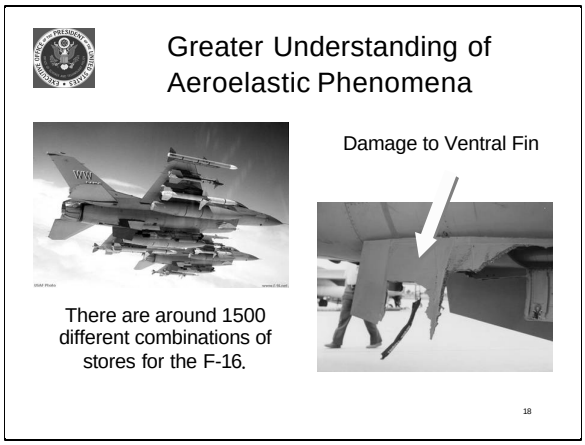
Let me give you an example of the impact computing research is having on developments in aerospace.

In the field of aerodynamics great strides have been made in Computational Fluid Dynamics to model and understand basic phenomena using Euler and Navier Stokes techniques in a steady flow field and on relatively simple configurations.

Making significant advances in vehicle performance while addressing such issues as acoustics, signature, and adaptable structures in a hostile or unsteady environment will require large growth in computing capability. With this capability comes the potential to revolutionize the design process and significantly lower the design cycle time and cost.

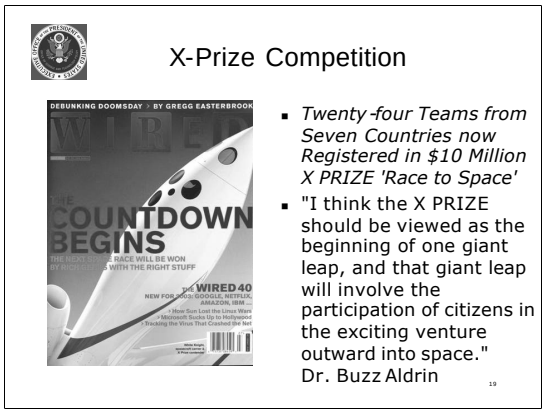
I've been told that virtually every new airplane that has made it to flight test has had anomalies of one kind or another. There is significant opportunity to identify these potential problems and design them out before the vehicle ever flies. This will require advances in computing capability to do the high quality computational fluid dynamics analyses necessary up front, during the design phase.

NITRD will help address these needs.



To underscore the importance of modeling very complex flow fields. This F-16, with its large complement of stores behaves very differently than the idealized configuration that can be analyzed with today's techniques and computing capability.

The ability to understand this behavior analytically, using advances in high-end computing, has the potential to save large amounts of time and money.



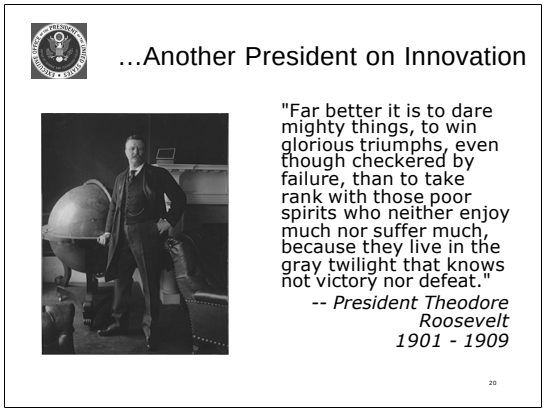
Nanotechnology, Biomimetics and High-End Computing research along with other critical components of the federal R&D portfolio help lay the foundation for innovation and discovery.

President Bush, through his unprecedented support for R&D, is also creating the underlying environment that will help set the atmosphere in which the private sector can continue to innovate in aerospace.

And if there is one thing the aerospace community has always been good at it is innovating. Federally funded research clearly has been a driving force behind technological breakthroughs in aerospace, but let us not forget that it was the Wright Brothers, and not the government funded Samuel Langley, who made the first flight.

So let me end with an example, not of government funding, but of the power entrepreneurial ideas.

The X-Prize competition is a wonderful example of how the innovative spirit of the aerospace community will continue to push technology. In fact, throughout the history of aviation, prizes have propelled major advances in speed, distance, technology and endurance. In 1927, when Charles Lindbergh won the Orteig Prize for completing his non-stop flight between New York and Paris, he became one of the most famous persons on Earth.



And as we celebrate 100 years of innovation, and we look back to when the Wright Brothers first took flight, it is compelling to recollect another President's challenge to future innovators.

In the word's of President Roosevelt:

"Far better it is to dare mighty things, to win glorious triumphs, even though checkered by failure, than to take rank with those poor spirits who neither enjoy much nor suffer much, because they live in the gray twilight that knows not victory nor defeat."

These words of inspiration ring just as true today as they did 100 years ago.

Thank you for giving me the opportunity to participate in this wonderful symposium.