

**Administrator's Remarks
Washington Space Business Roundtable
Washington, D C
June 9, 1999**

I appreciate that so many of you ventured out into this heat-wave to be here this afternoon. Had we been a little further along in deploying the Earth Observation System, perhaps we could have made a long-term weather prediction and been able to pick a cooler day on which to come together.

I'm especially glad to be here in conjunction with today's student awards. I want to offer NASA's congratulations to Kurt (Mitman) and Jennifer (Lasher) for their scholarships, and to Tsega (Bekele) for her trip to Space Camp. You each have truly demonstrated an ability to achieve excellence. I hope you will all apply your talents in the years ahead in ways that will honor the recognition you are receiving today. Tsega, I can assure you that there are a large number of grown-ups in this room who envy your prize and would love to take part in some of the experiences that you will encounter at Space Camp.

We have had a rather full calendar the past few months that has provided the opportunity to visit with a number of diverse delegations from the space community. Let me mention a few of the highlights:

At the United States Space Foundation annual event, I was able to join General Richard Meyers and Keith Hall to discuss how our agencies can improve cooperation and bring higher value to the nation's investment in Research and Development.

At the annual gathering of AIAA, I laid out a set of requirements that I believe are vital in designing the next generation launch vehicles.

During a speech to the Agency's employees I emphasized how highly I place safety as a priority at NASA. Had I begun today's remarks by asking the question: "What is

NASA's number one core value?" I hope you all would have responded with the correct answer.

At a joint NASA-Department of Energy conference on Inner Space and Outer Space at the Fermi Lab, I invited the gathering of high-energy physicists to come to NASA with their most creative ideas to study the fundamental forces and structures of the Universe.

In cooperation with the National Cancer Institute, NASA sponsored a workshop at JPL on Sensors for Bio-Molecular Signatures. In my opening remarks I highlighted the workshop's goals to identify technologies that are biologically inspired and will have a profound impact on the early detection and treatment of cancer. Secondly, we wanted to examine how these same technologies could revolutionize space exploration by empowering humans in space.

The next day it was my pleasure to address the 100th Anniversary meeting of the American Astronomical Society. There, I challenged the attendees to reach beyond the capabilities of the Hubble and Next Generation Telescopes and push for revolutionary advances in the tools that will help unravel the mysteries of the Universe and advance knowledge regarding the origins of life.

As you can see, these forums have provided a stimulating opportunity to gaze into the future and describe unique challenges that will be met by the unique capabilities and expertise of NASA. Incidentally, you can review the complete text of these speeches on NASA's web site at www.nasa.gov.

In today's forum I'd like to address the Roundtable's interest on the commercialization of space and solicit your ideas on how to establish an effective partnership between NASA and the private sector to achieve our mutual economic goals.

Developing space as an arena of economic opportunity has been a driving goal of visionaries and entrepreneurs for decades. Long-range plans for the future from the

past were replete with predictions of space manufacturing, large numbers of people in orbit, and heavy commercial traffic on the highways of space.

Some progress has been made: A recent report identified worldwide space revenues of nearly \$100 billion – a milestone of some significance. At 64 percent, commercial industry revenues surpassed government investments, and could claim as much as three-quarters of the total within the next five years. Much of the success in this area is linked to communication satellites and the telecommunications industry, our most mature space business.

This is all promising, but wouldn't we all like to see even greater economic return from our investments in space? During the remainder of my remarks, I would like to discuss NASA's plans to assist in the expansion of economic opportunities in space.

Any discussion of commercialization of space has to begin with a hard look at the realities of access to space. We cannot put this issue off any longer. It has done us little good to expend energy on internal squabbles between the Shuttle vs RLV or emerging start up companies carping at the evils of government bureaucracy. The entire space community must come together to forge a unified solution.

But understand, there are no quick or easy answers. There are no magic bullets or magic technologies. The issue transcends politics. Currently, investment requirements are high, while returns are low. It may take a decade to develop a comprehensive solution capable of meeting the nation's launch needs. This is a complex problem with a host of formidable technical and economic challenges.

Designing a new family of expendable launch vehicles alone will not solve the entire problem. Applying retro-grade technologies to new reusable concepts will not be sufficient for the full range of payloads. Flying the Shuttle for another thirty years is not an optimal solution.

Recent launch failures have added a sense of urgency to creating a solution. Because of these failures, insurance rates have gone up; profit margins have gone down; and companies are losing critical assets that are necessary to be competitive in their markets, while government-sponsored researchers are experiencing setbacks in their attempt to advance knowledge. Perhaps even more importantly, our national security will be threatened if we are not able to reliably deploy high value assets.

None of the short-term fixes will produce the necessary orders of magnitude reductions in costs nor improvements in reliability and operability.

At NASA, we have made the commitment to help improve access to space – it is our Number 1 new development priority. Our goal is to reduce launch costs dramatically over the next decade, increase the safety and reliability of current and next generation launch vehicles, and establish new levels of performance for in-space propulsion.

We intend to design systems that require significantly lower numbers of ground processing personnel and will integrate advance information systems for design and operation activities. We are committed to technology advances and system improvements that will increase the reliability of future launch systems. Our goal is to achieve a reliability rating of not less than .999 in ten years, and .999999 within twenty. And while these improvements will increase reliability, they will also lead to decreased launch costs. When we design for safety we will need fewer people for operations, which in turn will help reduce costs. Our goal is to reduce the payload cost to low-Earth orbit by an order of magnitude within ten years to \$1,000 per pound and to \$100 per pound within twenty years.

We will make good on our Strategic Plan commitment to “enable revolutionary technological advances to provide space travel for anyone, anytime, anywhere more safely, and more affordably, with less impact on the environment and improved business opportunities and global security.”

Our Advanced Space Transportation Technology strategy includes systems engineering and concept analysis, ground-based technology development, and a series of flight demonstrators: the X-33 Advanced Technology Demonstrator, the X-34 Technology Testbed Demonstrator, and Future-X Pathfinders and Trailblazers. This approach will enable us to validate key component technologies, prove that the technologies can be integrated into a functional vehicle, and demonstrate low-cost operations.

We will make the technologies and expertise of NASA available to private sector companies as they develop their own launch solutions.

Until the America is able to design and build a new, human-rated, commercial system, NASA will continue to rely on the Space Shuttle to meet its human space flight requirements. The Shuttle continues to prove itself as the most versatile, robust, and reliable, space vehicle in use today. We are on schedule to complete the transition of Shuttle management to United Space Alliance under the Space Flight Operations Contract – an excellent example NASA’s commitment to turning low-Earth orbit operations over to the private sector.

We will continue to place the highest priority on the safe launch, operation, and return of the Space Shuttle and crew. I am very satisfied with the progress that we are making in identifying the upgrades that will be necessary to keep the Shuttle safe for another ten years. In July we will conduct an industry-NASA conference to define how to guarantee that we are making the appropriate upgrades to maintain safety as a priority.

Moving beyond launch access, I believe the commercial sector will benefit from NASA’s support of Intelligent Synthesis Environment (ISE), our new technology initiative. ISE will revolutionize the way we conceive, plan, and develop our missions. In today’s engineering environment, it takes too much time to complete the design phase of projects and it is not unusual for managers to commit up to 90 percent of the program’s cost during the development cycle when they have only 10 percent of total design knowledge.

To remedy this, NASA has initiated a ten-year project to research, develop, and implement the tools and processes to dramatically reduce spacecraft development time while creating much higher confidence in performance and total life cycle cost estimates. ISE will exploit emerging advances in ultra-high speed computing, advanced communication networks and totally new analysis methods; it will allow us to “virtually” build and test vehicles and systems before we spend money on expensive hardware and software. When fully deployed, ISE will enable geographically dispersed scientists and engineers to function as an integrated, collaborative team with the understanding and knowledge necessary to develop complex missions faster, with better-understood risk and much lower life-cycle costs.

It is my hope that the private sector will be able to improve its competitive posture by adapting ISE as a design tool for its own development needs.

In a related activity, NASA wants to support revolutionary advances in Information Technology. Just a few weeks ago, NASA expanded a partnership agreement with Silicon Graphics to advance development of modernization tools for super computers. Working with personnel at the Ames Research Center, Silicon Graphics successfully developed and tested the largest single image super computer in the world – a 256 node capacity. Our new agreement calls for a doubling of this capacity to a 512 node machine, with progressively more sophisticated individual processors to follow.

We will develop computers that mimic biological functions that will operate a least a million times faster than today, but consume only a millionth of the energy – much like the human brain.

With this kind of computing capacity, capabilities, and with our ISE tools, we will undertake smart design and operations, leaving people to do what we do best: imagine and create. NASA will lead in developing new design tools, like total immersion virtual presence, with sight, sound, and haptic feel. Neural nets and genetic algorithms will

allow our robotic voyagers to rely less on commands from Earth and more on their own learned experience. Engineers from various NASA centers will work through an information power grid to develop advanced aeronautics systems. The grid will bring together geographically distributed assets into a single, virtual machine, revolutionizing the way we design our aircraft, spacecraft, and missions.

With last week's delivery of supplies and equipment to the Zarya and Unity modules, let's take a moment to review the commercial opportunities for the International Space Station. As the first modules were being docked last November, NASA released the Commercial Development Plan for the ISS. This was the first step in fulfilling directives of the Commercial Space Act of 1998, requiring NASA to conduct an internal study on "Potential Pathfinders Areas for Commercial Development of the ISS."

The study concluded that opportunities exist for the private sector-sponsored R&D; for operating and servicing elements of ISS ground and flight infrastructure, and new capabilities to augment existing Station elements and distributed systems.

Based on this study, NASA elected to pursue a "pathfinder" strategy to identify private companies with the capabilities and interest needed to pursue these, and other, opportunities.

We intend to make this an on-going activity. If you are interested in pursuing Station opportunities, it is useful to distinguish between "unsolicited proposals," "Requests for Proposals," which you may be use to, and entrepreneurial "offers." The former terms have specific meaning under FAR regulations and would limit the range of potential economic development activities.

Under FAR, an unsolicited proposal is defined as "a written proposal for a new or innovative idea that is submitted to an agency on the initiative of the offeror for the purpose of obtaining a contract with the Government, and that is not in response to a request for proposal.

Although NASA will continue to be receptive to unsolicited proposals, we believe the Congressional vision for economic development went beyond typical government contracts. For this reason, we have extended the scope to include entrepreneurial “offers” defined as “a written offer for a new or innovative idea, involving ISS assets, that is submitted to NASA on the initiative of the offeror for the purpose of creating value-added products or services for sale in private markets, and that is not in response to a request for proposals.

To date, we have received eight such proposals from commercial providers. Discussions are now underway between representatives from the companies and NASA. We have asked KPMG Peat Marwick to convene an independent panel to review the range of market assessments and to synthesize a report on market potential, perceived barriers to market entry, and the most effective pathfinder enterprises. It is our intention to close on the approved offers for the pathfinder programs before the end of the fiscal year.

Because of the international nature of the Station, we have also established an International Consultative Working Group to create consistent policies and procedures related to pricing, property rights, and space allocations for commercial activities.

While the Station does its part to advance the interests of your colleagues, NASA is also actively supporting those companies who have their sights set on Earth. For the past ten years, the Stennis Space Center has managed the Earth Observation Commercial Applications Program (EOCAP), a NASA-industry partnership opportunity where both parties bring money to the table, and both parties share in the benefits. Over this period NASA’s \$24 million investment has been matched by industry’s \$25 million contribution. The program has spawned 48 individual projects involving 142 companies, 58 agencies, 36 universities, 11 trade associations, creating 55 new value-added products.

Last fall, NASA awarded the Consolidated Space Operations Contract (CSOC) to a team led by Lockheed Martin. The contract has already consolidated five space operations contracts, and ten more will transition to the program in the months ahead. CSOC provides a new approach to space flight operations, consolidating and privatizing operations facilities under a single contract. Small business will also benefit from this initiative as NASA applied a 25 percent small business goal to the CSOC contract. Over the potential 10-year life of the contract, CSOC is expected to provide a cost savings to the taxpayer of \$1.4 Billion in the conduct of NASA's missions.

To maximize the nation's return on NASA's research investment, we are also kicking off a new initiative revitalizing our efforts to ensure that technologies developed for our missions are finding their way into the private sector with greater speed and effectiveness. Our Commercial Technology Program is developing new business models to enable much broader leverage for participating companies in their markets and business plans.

The goal is to align the primary technology needs of the four NASA Enterprises with those of the needs of industry. By the end of the summer, we will have established new models and processes designed to reduce costs and improve technologies for NASA missions, while improving the competitive posture for US industries. Working with major industry trade associations, we will identify key sectors and technologies on which to focus the initiative.

In addition to commercialization opportunities, NASA is beefing up its use of outsourcing. One of our largest initiatives in this area is the Outsourcing Desktop Initiative for NASA (ODIN). The ODIN initiative is intended to realize savings in the area of employee work station services and support. Instead of buying hardware and systems, ODIN outsources this responsibility to the private sector. This will enable economies through large procurement, being able to update systems more rapidly, and even allows for other agencies to ride-on our contract vehicle. The ODIN contract as

awarded one year ago and five delivery orders have been issued to date for a total dollar value of \$165 million.

Finally, I have encouraged our four enterprises to maximize data buys and commercial purchase of spacecraft as they develop strategies to achieve their goals. We have made significant success with data buys for programs within the Earth Science Enterprise, and intend to replicate this process elsewhere. In the upcoming year we hope to be able to buy data services for Landsat 8 instead of developing it as a traditional government program. I challenge you to send in proposals that will save money, produce more effective data, and bring higher value to the nation.

We are also purchasing a greater number of spacecraft from the private sector. Over the past four years, we have contracted for the production of 25 spacecraft to support our missions. We now have the capability to buy spacecraft directly from a pre-competed, pre-approved catalog.

What are the benefits to forging NASA-industry partnerships to advance commercialization of space? For starters, it will lead to expanding the aerospace sector as a major driver of the nation's economic engine. As the delivery of routine services and products are transitioned from the government to the private sector, NASA will be able to apply its valued resources towards being the premier R&D agency we were intended to be. We will be able to concentrate on expanding the frontiers of space, push the design envelopes to deliver cutting edge technologies, and advance knowledge that will be applied to a diverse range of human endeavors.

Industry will benefit as new companies are formed, space technologies find new applications in commercial products and services, and new high skill, high wage jobs are created.

As we add to our track record of success we will be in a better position to attract investment capital. There is no reason why we should not be able to enjoy the same

measure of success, and secure the same level of investment support that the information systems industry is experiencing today.

With this success, with the technical advances, and with improved access to space, I believe we will truly open the space frontier to a range of opportunities that seem like science fiction today. With America's entrepreneurial spirit and capacity for innovation, does anyone here think that endeavors such as space tourism, public engagement in commercial exploration, and who knows what else is not possible?

Based on this top level summary of commercial opportunities that I have described today, I hope you will agree that NASA is indeed serious about supporting the economic development of space. I know there are those of you who think we need to do more, need to move faster, need to remove perceived barriers to your ideas. There are times when I certainly share your concerns.

NASA is a forty-year-old institution with a proud heritage and a culture that was formed at the height of the Cold War. Radical change in thinking does not happen as quickly as some of us would like. It certainly hasn't happened at the pace I envisioned when I came to NASA seven years ago.

To accelerate the implementation of our commercial goals, and to signal to ensure the highest visibility on the Agency agenda, I recently appointed a Special Assistant for Commercialization – Dan Tam. Prior to this assignment, Dan held a key acquisition management position for TRW Space and Electronics Group. I have charged him with the responsibility to work across all field centers and programs in pursuit of entrepreneurial innovation. I have asked him to think out-of-the box to establish a consistent set of procedures and policies across the four enterprises and ten centers to enable the more expeditious implementation of our commercialization goals.

If you have ideas that you would like to bring to our attention, or if you have experienced barriers within the organization that are inconsistent with the vision I have laid out today,

I encourage you to contact Dan. At the moment, he is bi-coastal with offices at NASA Headquarters here in Washington and at JPL. I hope you will help me help him successfully accomplish the common vision that we all share for economic development in space.

In five years, the Nation will have an opportunity to commemorate two significant events of interest to our community. In 2003, it will have been 200 years since the acquisition of the Louisiana Purchase enabled the development of a frontier of immense potential. In that same year, we will also commemorate the 100th anniversary of the first air flight at Kitty Hawk. Both events led to unimaginable commercial growth that was not appreciated in its time. Government and industry partnerships helped to take full advantage of these pioneering efforts.

As we launch into the New Millennium, it is my hope that similar unimagined commercial growth in space will begin to emerge. As noted in a fascinating book on the history of great expeditions called *The Explorers*, "By striving to do the impossible, man has always achieved what is possible. Those who have cautiously done no more than they believed possible have never taken a single step forward."

I look forward to working with all of you to strive for the impossible and take bold steps into space.