The Next NASA Administrator, FY10 and Beyond

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1 Setting the Stage

It is early January of 2009, and I have just been asked by the president-elect to be the next administrator of NASA. The upcoming presidential team was fond of Michael Griffin the previous NASA administrator and requested him to continue his role for an additional 4 years. However Griffin missing his previous lifestyle decided to step down for personal reasons. The change in leadership was a surprise to the NASA community and has left many sectors of the space faring industry nervous and uncertain for where the future of NASA will be heading. Luckily many members of Griffin's administration such as Alan Stern and Shana Dale will have committed to working with me over the next for years bringing stability to the change in administration.

1.1 NASA in 2009:

NASA has changed significantly throughout Michael Griffin's 4-year administration. The Vision for Space Exploration (VSE) is well underway and NASA is spending billions to develop the next crew and heavy-lift launch vehicles (Ares 1 & 5 respectively) which will take American's back to the moon. In addition, the space shuttle is on the verge of retirement with an estimated 7 flights remaining. After receiving a generous increase in the FY08 budget request, NASA did not see the trend continue in FY09 and received an appropriation which was equal to FY07 adjusted for inflation. As a result of this funding instability as well as continuous problems in systems engineering on the constellation program, the Ares 1 human launch vehicle is projected to ready for flight by late 2015 leaving a 5.5 year period where American astronauts will be grounded.

NASA's science mission directorate has remained stable over the last 2 years under the direction of Alan Stern. Although the request for additional funding is ubiquitous among the science programs, the community has become more accepting of a slowed rate of growth NASA has appropriated to the science mission directorate. Alan Stern's style of leadership has been controversial but yet pleasing to the majority of the science community. Although Stern has yet to cancel a mission due to cost overruns at the contractor level, many missions have been significantly scaled back to meet cost and schedule. As a result, the budget within the science directorate has become more predictable resulting in a recent request for proposals (RFP) for two new earth observing satellite (EOS) missions to be instated as early as 2010. The aeronautics directorate has remained stable over the past two years however the aeronautic community is still feeling the effects of having the research budget cut by more than 40% over the last 5 years.

1.2 The US in 2009:

The new democratic president had little to say about the future of NASA during the campaign. The only reference made was during a debate where it was stated by the

president-elect that the 5-year absence of Americans in space was unacceptable and that NASA should "use the funds it currently has to shorten this period." In addition, the new president's platform was heavily based on education reform and it is likely that this initiative will affect every area of the government.

The several members of the congressional branch are furious with the 5.5-year American absence in space and fact that NASA has to rely on the Russian Space Agency to get American's to the International Space Station (ISS), a largely American investment is inexcusable. In addition, many additional members of congress are working hard to reform the International Traffic and Arms Regulation (ITAR) which is preventing billions of dollars in international aerospace related business. However in an ironic sense these same members have been opponents of the Chinese request of sending their own astronauts to the ISS. Congress has consistently tried to increase NASA's budget and were successful in FY08, however were not able to continue this trend for FY09 under Bush's policy of lowering government spending. For a third consecutive time in FY09, several key space-faring members of congress have requested a one-time billion dollar allocation to NASA's budget to offset funds lost during the wake of the Columbia accident. However this allocation failed to reach the president's desk for three consecutive years.

1.3 The World in 2009:

Many nations around the world are rapidly developing space technologies and are showing a commitment to towards a human presence in space. Most notably, the successful launch of the Columbus module from the European Space Agency (ESA) and the KIBE module from the Japan Aerospace Exploration Agency (JAXA) to the ISS has given the agencies a high level of demand for quick access to the station. As a result, the Russian Space Agency has become swamped with requests to launch humans and cargo to the international space station. Although the Soyuz launch vehicle has doubled in price, the vehicle is booked through 2013. The Russian Space agency is looking to expand their production lines and is expecting to be ready to handle the increased demand by 2014. The Chinese Space Agency has also shown continuous effort join the ISS. As President Hu Jintao of China stated: *"The Chinese people are willing to join with all other people to go along the road of peaceful utilization of outer space and cooperate in international space exploration,[1]"* Although their request has been denied by the United States for ITAR related issues, they have continued to lobby for access to the ISS and have put together a proposal to add a Chinese Science Module to the ISS. They have also shown an evidence of developing heavy lift launch capability to which many believe is an attempt to compete with the Soyuz.

2 The New Administrator's Focuses

As the next NASA administrator, I plan to continue many of the policies and practices implemented by Griffin's administration. It is my goal to provide stability to NASA's budget and not allow for rapid changes as experienced in the past. As Griffin stated during his time as administrator: *To be successful, program managers (whether in*

[1] Quote by President Hu Jintao of China, stated in a news article: *China's Hu Praises Military, Scientists* Dec 12, 2007 by the Associated Press

government or industry) need stability. Additionally, they need the knowledge that there will be such stability; defensive planning is inherently wasteful.... If funding is in fact stable, then additional money will not be available to solve problems which are, inevitably, encountered in any state-of-the-art development program.[2]" In addition, there are four specific areas which I plan to focus my attention on and improve the work that Griffin's administration initiated. In particular, I plan to focus in areas related to education, keep the constellation program in the American sector, expand the Commercial Orbital Transportation Services program, and to slowly reestablish research funding to the levels seen prior to 2004.

2.1 Education

In anticipation toward the new president's education policies, I would form a committee to determine how the existing funds education funds are spent and the effectiveness of the different programs. I would challenge the committee to study existing educational programs in existence both at NASA and other organizations around the country and create a prioritized list for NASA's best interests. The list would enable reviewers to see which programs are effective towards the general public, K-12 students and the higher education sectors. I would expect certain programs like the Space Grant Consortium, and competition based programs to be highly ranked, while other such programs such as single class school field trips or NASA TV to be less effective. Under the advisement of the committee, a rating system could be introduced which determines the program cost per citizen influenced the benefits gained. I would anticipate that these results would show that there are many programs which although have been historically successful, are not reaching a wide audience for the invested cost. In addition to this committee, I would start a nation wide initiative which would mandate NASA-paid employees, and contracting companies to fulfill a minimum outreach requirement to their local communities. Outreach could be in the form of on-sight lectures, student mentoring, and assistance with the educational curriculum development. Examples for how corporations can contribute to this would be:

- At the public level, companies could sponsor commercials stating NASA's vision for space exploration and how their company contributes to the vision and the local community.
- At the K-12 level, companies could offer on-sight field trips, give class room lectures, or sponsor a regional science fair.
- At the higher education level, companies could donate time at their facilities for students performing research or provide mentorship sessions to give feedback on a particular design.

To help encourage this effort, incentives could be given to employees or companies who have shown demonstrated commitment to their local community and could eventually become criteria before being awarded for a project. This style of project would work well is it uses existing resources and does not require large financial investments.

As administrator, I would stabilize the educational budget and guarantee a percentage (similar to what was spent in FY08) of the total NASA budget to be geared towards education. Although education is not represented in NASA's mission statement,

[2] Michael Griffin: Human Space Exploration: The Next 50 Years, written for Aviation Week, March 14th 2007.

I feel that education is important to the agency's future and is within its best interest to ensure a talented next generation of employees and good public support. With the president's sweeping education reform, I would make the argument is heard to the Office of Management and Budget that NASA's mission inherently inspires the next generation and that if education becomes a mandated top financial priority for NASA then the agency will be forced to take money out of exploration, science and research which are the ultimate drivers for inspiration and education.

2.2 Keeping Constellation American

It is my belief that one of the primary economic functions of NASA is to stimulate advanced technologies and development within the United States. This is critical to the country if the United States is going to remain an economic leader in science and engineering. When the Vision for Space exploration was announced a decision was made to keep the project development within the American sector to stimulate the economy and to prevent issues relating to ITAR. As the next administrator I would work to ensure that this initiative continues and that all of the components of the constellation design remain American built.

As Michael Griffin stated during his time as administrator: *"Space exploration, whether human or robotic, is the grandest and most technically challenging expression of human endeavor, I think it is in our nation's best interest to work together, learn as much from each other as different countries and cultures about how to go about solving unique problems presented by the exploration of space.*[3]*"* While I would work to ensure that NASA continues to stimulate the nation's economy, like Griffin I understand the importance of international collaboration and would work to open opportunities to learn from one another. However I would make it clear that NASA would not give free rides to other countries and that an expectation would be put in place to maintain equality within the partnerships. I would base this system on how the ESA operates financially in which each country has a role in the program equal to the investments that they make

2.3 Enhance Commercial Orbital Transportation Services (COTS)

The NASA budget does not have the necessary resources required to expedite the Ares 1 human launcher vehicle completion to be earlier than 2015. As a result, it is difficult for NASA to meet the requests of the law makers without a significant budgetary increase. Since the Ares project is already half-way through development, it will take even more funds than the initial expedition estimates Michael Griffin gave to congress in 2007 (ref). As a result, NASA needs to reprioritize existing funds to accomplish both the goals of the Vision for Space exploration while at the same time maintaining a human presence in space and on the ISS. As the next NASA administrator, I would increase funding toward the COTS effort and direct its development into existing vehicles which can realistically be completed in the next few years. The intention of COTS is to: *"Implement U.S. Space Exploration policy with investments to stimulate the commercial space industry, facilitate U.S. private industry demonstration of cargo and crew space transportation capabilities with the goal of achieving safe, reliable, cost effective access to*

[3] Michael Griffin, Nov 16th, 2007 speaking to Science, Technology and International Affairs Students at Georgetown University

low-Earth orbit, and create a market environment in which commercial space transportation services are available to Government and private sector customers[4]*."* which I believe is the correct approach towards launching cargo into low earth orbit. However the COTS program has had problems since its initiation and its contractors were re-bid in early 2008.

It is my view that the reason the Crew Exploration Vehicle (CEV) is delayed is a result of the mission complexities required for sending humans out to the moon and beyond. On the contrary, putting humans into low earth orbit is a relatively simpler and more cost effective process. In addition, mandating that the CEV have the capability to dock with the ISS greatly increases the complexity put onto the CEV engineers as they have to accommodate existing hatches, life support systems and crew accommodations. As the next NASA administrator, I would decouple the CEV and ISS servicing requirements. I would also focus the COTS program towards companies that have demonstrated capabilities such as the Atlas 5 by Lockheed Martian, or the Falcon Vehicle by Space Exploration Systems which have the capacity to launch a small crew into orbit for short durations. By expanding the COTS program these vehicles could become man-rated and designed to transport humans to and from the ISS in a short period of time. This would be a helpful asset to NASA and allow the CEV to focus solely the moon.

I believe that the industry and congressional reception to this move would be favorable as it shortens the gap of the American absence in space. It also keeps the flight operations group at NASA employed during for a longer duration. However most importantly, it enables commercial companies the ability to put humans in space in a competitive international market therefore reducing costs. *"This is the first opportunity NASA has taken to engage entrepreneurs in a way that allows us to satisfy our needs and lets commercial industry gain a foothold. It could, and should, have profound impacts on the way NASA does business.*[5]*"* There are some negatives to this idea mainly that it would significantly slow the development of the CEV and could take the program out of spotlight. In addition, several companies who have a large role in the CEV but not in COTS would be dissatisfied as there would be additional delays and less future demand for CEV launches in the near term future. As administrator, I would work to ensure that the CEV remains in the spotlight as NASA's preferred vehicle and state the importance of a vehicle that can bring us to the moon and beyond.

2.4 Re-instate advanced concepts & research

During Michael Griffin's time as administrator, the agency underwent a series of reductions in research funding. Given the budgetary uncertainty at the time and large changes within the underway at the agency, the cuts were justified. However it is my belief that NASA will not be able to advance technology without re-establishing the many lost areas of research. As the new administrator I would do whatever is possible to gradually bring this research back into NASA facilities and American universities to the level previously seen in FY04. In particular, I would re-open NASA's Institute of Advanced Concepts which has a goal to propose NASA missions which are several decades out. In addition, I would also encourage areas of research in spacecraft

[4] Commercial Orbital Transportation Services Phase 1 Demonstrations Announcement Number JSC-COTS-2

[5] Marc Timm, acting Commercial Orbital Transportation Services (COTS) Program executive in NASA's Exploration Systems Mission Directorate

propulsion, and protection from radiation as these are fields of study which can greatly advance our range of human exploration.

3 FY10 NASA Budget Proposal

NASA's current budget projections can be seen in Figure 1 below. The projections have several distinct events as NASA moves into the next decade. Most notably are the two sharp cuts for the Space Shuttle program in 2010 as it retires and the decline of the International Space Station funding in 2016. When stepping back, it helps to understand that the Science and Exploration Directorates hold a huge portion of NASA's overall budget. Under my new administration, I plan to propose to the President and OMB to make several changes within the budget to support my focus areas without requesting additional funds. My proposal can be seen in Figure 2 below with more details specified in Table 1 below.

3.1 Budget Proposal

3.1.1 Science

My budget proposal starts with the Science Directorate in which I propose to maintain the current allocation over the next eight years adjusted for inflation. Although this is slower than the rate of growth than seen in the past, I am confident that Alan Stern's style of management will allow for an efficient use of resources and the directorate's science quality output will increase over time.

3.1.2 Exploration Systems

I am proposing a 30% cut in Exploration systems for FY10. This will lead to a further delay of the CEV and Ares launch vehicle completions causing a full year delay. Over the next 8 years this directorate will dramatically increase to become a half of NASA's budget and will allow for the Ares launch vehicle and crew exploration vehicle to be completed in 2017.

3.1.3 Aeronautics Research

I have proposed a small increase in aeronautics research over the next 4 years with adjustments to inflation following into FY18. It is my belief that NASA needs to show a strong commitment to aeronautics development and will encourage research relating to America's air transportation systems and hypersonics.

3.1.4 Cross Agency Support Programs

I am proposing modest increases in cross agency support programs over the next two years after which the allocations are adjusted with inflation. The programs which are funded in this section are essential to ensuring that NASA runs more efficiently and allows the public and small businesses easier access to NASA. Education has a significant increase over the FY10-FY12 which is put in place to help support my initiatives and the future president's on education reform however the increases end by FY13. At that point the Education office will have a balanced program with minor increases based on inflation. (Note, I have re-defined a new category for the COTS program and have removed it the Cross Agency Support Programs.)

3.1.5 Space Operations

As initiated by the Griffin administration, FY10 is the last year in which the shuttle will be funded. The program has been scheduled to be terminated for 6 years and all available funding will be absorbed into the other areas. This drastic change has been expected for several years and the impact should be gradual as the workforce transitions towards the vision for space exploration. The ISS funding for FY10 remains identical to what the Griffin administration projected. In the long term, the ISS funding slowly decreases however unlike Griffin's projection I have adjusted the allocations to maintain a significant portion of the overall budget dedicated towards the ISS through FY18.

A new category entitled: COTS ISS Support has been initiated to support the commercial effort of sending astronauts and consumable cargo to the ISS. This effort is a drastic change to NASA's previous policy however will allow American astronauts and paying international astronauts access to low earth orbit by 2013. This comes at a large cost; however the simplicity of this system and the commercial availability of this vehicle will be a great asset to NASA and the country over the next several decades.

3.1.6 Inspector General

Proposed budget is adjusted for inflation.

3.2 Congressional Strategy

The proposed budget does have some drastic changes; however I am confident that the executive and congressional branches of government would be favorable to these changes. I think the initial shock of further delaying the constellation program will draw a significant amount of criticism. However upon realizing that we would remain committed to the ISS and continue to be capable of putting Americans back into space in an increasing competitive international market will eventually win over the critics. One of the biggest critics I anticipate are the companies which have a large role in the CEV program but not in COTS such as ATK. My changes force delays on their contracts however they will need to be reminded that the Constellation program will still provide business for them and that the delays are necessary to get the job done more efficiently.

The research funding and educational funding increases will be well received by universities, NASA and as a result, congress. The majority of this funding will come from the exploration systems directorate but I will argue is justified to ensure that our current resources are utilized.

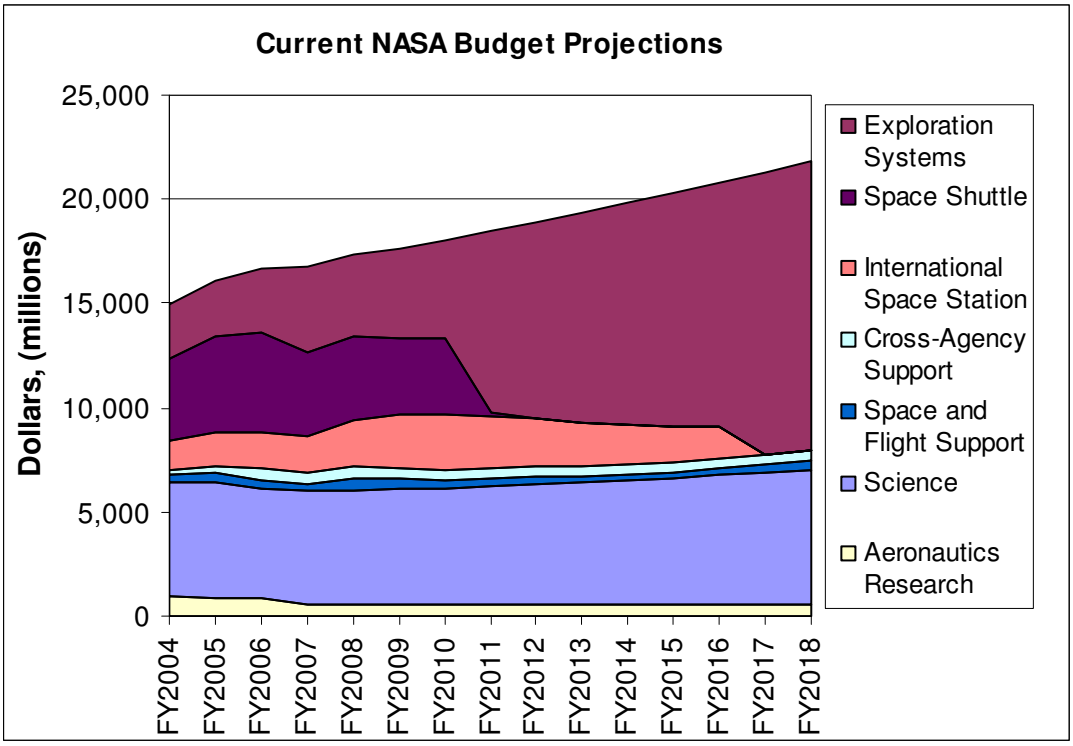


Figure 1: Current Griffin NASA Budget Projections FY08-FY18[6],[7]

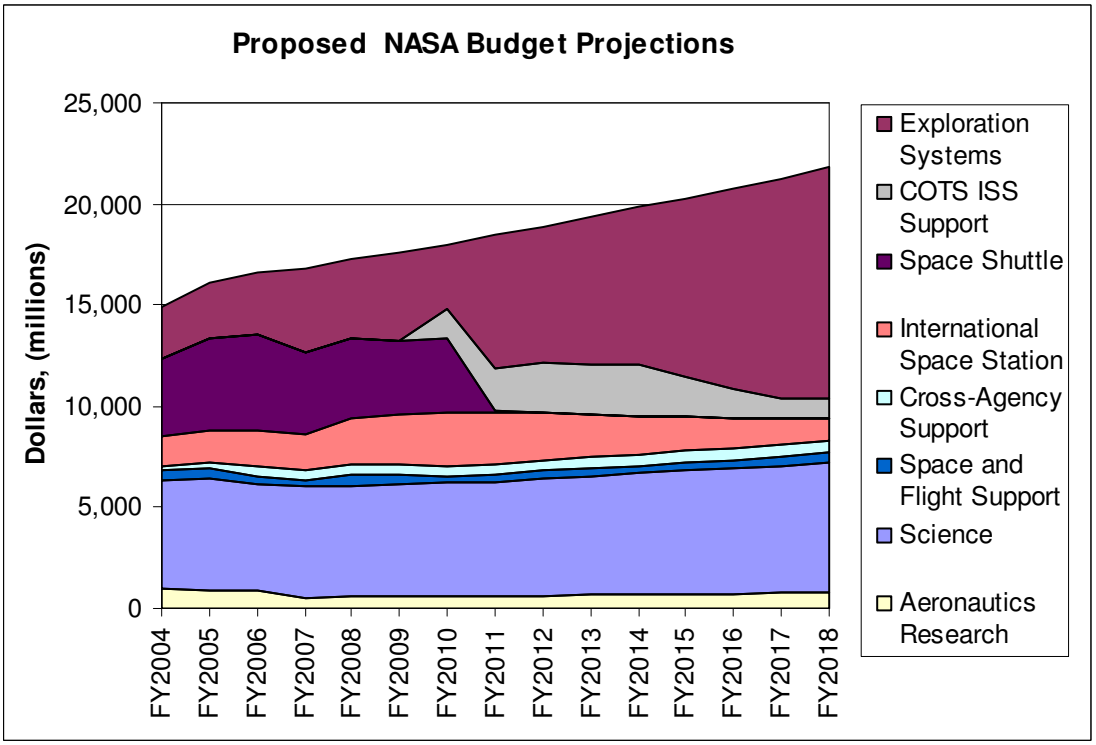
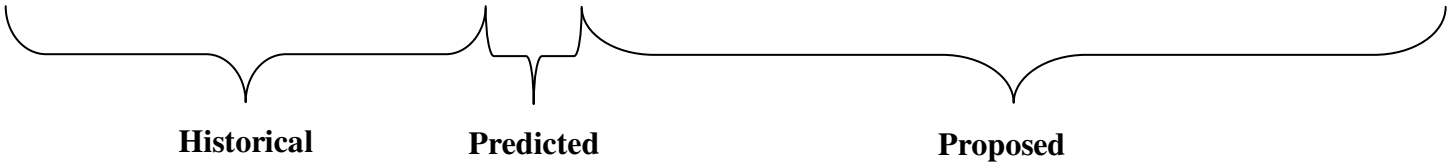


Figure 2: New Administrator's Proposed NASA Budget FY10-FY18

[6] Data taken from NASA FY05,FY06,FY07,FY08 budget requests, and the FY08 budget projection.
[7] Long term NASA plans based on: [NASA] *Strategy Based on Long-Term Affordability*, excerpt from the McCray PowerPoint presentation. Presented by B.Davis during ASTR4800 class on Sep 28, 2007.

Table 1: New Administrator's Proposed NASA Budget FY09-FY18

	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Science, Aeronautics and Exploration	9,063.0	9,334.7	9,721.3	10,650.6	10,483.1	10,868.4	11,364.2	15,386.5	15,888.6	14,330.8	14,999.8	16,178.9	17,357.9	18,486.9	19,155.8
Science	5,425.0	5,527.2	5,253.7	5,466.8	5,516.1	5,555.3	5,600.6	5,656.9	5,802.7	5900.0	6000.0	6100.0	6200.0	6300.0	6400.0
Earth	2,275.0	2,155.8	2,163.5	1,464.5	1,497.3	1,545.8	1,558.4	1,574.1	1,614.6	1,641.7	1,669.5	1,697.4	1,725.2	1,753.0	1,780.8
Heliophysics	1,897.0	1,858.1	1,582.3	1,028.1	1,057.2	1,028.4	1,036.8	1,047.2	1,074.2	1,092.2	1,110.7	1,129.2	1,147.7	1,166.3	1,184.8
Planetary				1,411.2	1,395.8	1,676.9	1,690.6	1,707.6	1,751.6	1,780.9	1,811.1	1,841.3	1,871.5	1,901.7	1,931.9
Astrophysics	1,253.0	1,513.2	1,507.9	1,563.0	1,565.8	1,304.2	1,314.8	1,328.1	1,362.3	1,385.1	1,408.6	1,432.1	1,455.6	1,479.0	1,502.5
Exploration Systems	2,528.0	2,684.5	3,050.1	4,152.5	3,923.8	4312.9	3,195.4	6,610.4	6,415.2	7,226.1	7,759.4	8,801.7	9,843.6	10,833.7	11,362.2
Constellation Systems	0.0	526.0	1,733.5	3,232.5	3,068.0	3,372.2	2,498.5	5,168.6	5,016.0	5,650.1	6,067.1	6,882.0	7,696.6	8,470.9	8,884.0
Advanced Capabilities	2,528.0	2,158.4	1,316.6	920.0	855.8	940.7	696.9	1,441.8	1,399.2	1,576.1	1,692.4	1,919.7	2,146.9	2,362.9	2,478.1
Aeronautics Research	946.0	906.2	884.1	529.3	554.0	569.3	588.3	608.4	629.1	650.2	672.5	695.5	718.9	743.4	769.0
Aeronautics Technology	946.0	906.2	884.1	529.3	554.0	569.3	588.3	608.4	629.1	650.2	672.5	695.5	718.9	743.4	769.0
Cross-Agency Support Programs	164.0	216.7	533.5	502.0	489.2	450.0	480.0	510.8	541.7	554.5	567.9	581.7	595.4	609.8	624.7
Education	164.0	216.7	162.4	167.4	153.7	155.0	170.0	185.0	200.0	204.7	209.7	214.8	219.8	225.1	230.6
Advanced Business Systems	n/a	n/a	n/a	97.4	103.1	69.4	75.0	80.0	85.0	87.0	89.1	91.3	93.4	95.7	98.0
Innovative Partnership Program	n/a	n/a	214.8	215.1	198.1	191.4	200.0	210.0	220.0	225.2	230.6	236.2	241.8	247.6	253.7
Shared Capability Assets Program	0.0	0.0	0.0	22.1	34.3	34.2	35.0	35.8	36.7	37.6	38.5	39.4	40.3	41.3	42.3
Exploration Operations	5,857.0	6,704.4	6,869.7	6,108.3	6,791.7	6,710.3	8,125.6	5,036.6	5,478.0	4,980.0	4,780.0	4,080.0	3,380.0	2,750.0	2,600.0
Space Operations	5,857.0	6,704.4	6,869.7	6,108.3	6,791.7	6,710.3	8,125.6	5,036.6	5,478.0	4,980.0	4,780.0	4,080.0	3,380.0	2,750.0	2,600.0
Space Shuttle	3,928.0	4,543.0	4,777.5	4,017.6	4,007.5	3,650.9	3,634.4	116.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
International Space Station	1,497.0	1,676.3	1,753.4	1,762.6	2,238.6	2,515.1	2,609.2	2,547.5	2,600.8	2100.0	1900.0	1700.0	1500.0	1300.0	1100.0
COTS ISS Support	n/a	n/a	n/a	n/a	n/a	n/a	1500.0	2000.0	2500.0	2500.0	2500.0	2000.0	1500.0	1000.0	1000.0
Space and Flight Support	432.0	485.1	338.8	328.1	545.7	544.3	382.0	372.9	377.2	380.0	380.0	380.0	380.0	450.0	500.0
Inspector General		31.3	32.0	33.5	34.6	35.5	36.4	37.3	38.3	39.2	40.2	41.1	42.1	43.1	44.2
TOTAL	**15,378.0**	**16,070.4**	**16,623.0**	**16,792.3**	**17,309.4**	**17,614.2**	**18,026.3**	**18,460.4**	**18,905.0**	**19,350.0**	**19,820.0**	**20,300.0**	**20780.0**	**21280.0**	**21800.0**
Year to Year Change		4.5%	3.4%	1.0%	3.1%	1.8%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%



Points of Interest:

- Research investments increased: in education, science & aeronautics.
- New category formed entitled: COTS ISS Support to fund operational costs for commercial ISS flights
- Funding increases towards interagency management and small businesses, (advanced businesses and Innovative Partnership Programs respectively)

4 Conclusion

NASA is at a crossroad in which the funding decisions made during FY10 will have dramatic effects towards the Vision for Space Exploration and America's near-term presence on the International Space Station. Michael Griffin's stature as administrator will be missed as he helped to restore confidence within the organization at a dynamic time within the agency. However despite the many successes, the Griffin administration's funding projections did not meet the educational needs of the nation, neither was the administration active enough to find alternative means for maintaining an American presence in space after the Space Shuttle retirement. As the next administrator I plan to adopt the style of leadership left behind by Griffin as it has been well received by the aerospace industry. In addition, there are four main areas where I will focus my time on:

1. Stabilize but not increase the educational budget. Make the educational budget more effective by initiating a committee which investigates the best way to spend educational funds. Initiate a mandate for NASA employees and contracting companies to become more involved in pubic outreach on behalf of their companies and NASA's mission for space exploration
2. Continue the initiative to keep the Vision for Space Exploration vehicles within the American sector. Encourage international partnership but maintain a sense of equality among the partnership.
3. Expand the COTS program significantly and direct the program funds towards companies which have demonstrated launch capabilities in order to reestablish a human presence in space by 2013. Modify the CEV mission goals to not require servicing capabilities to the ISS, allowing for a more cost effective design. Encourage ISS partners to use American commercial launch services.
4. Expand research funding at the NASA research centers and American universities.

It is an exciting time for our nation as we continue to reach out and into the space frontier and learn of our origins and how we can use this knowledge to better life and understanding here on the ground. For the first time in history, we have a fully built international space station which is capable of performing research never before attempted with international partners. We have planetary missions near Mercury, Mars, Saturn and Pluto as well as huge telescopes peering into the early universe. Finally, we are preparing a second generation of human spacecrafts under development to send humans back to the moon in preparation for Mars. What an exciting time to be involved in space exploration.