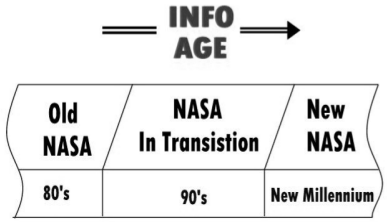


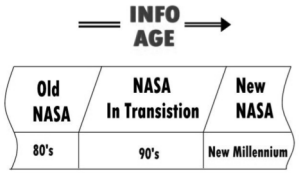
NASA FBC TASK

FINAL REPORT

March 2000

AJS
March 2000

NASA FBC TASK



Introduction

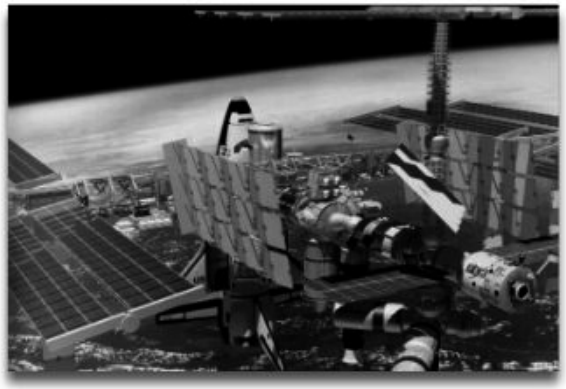
- This Task was accomplished for NASA HQ in the period July 1999 through January 2000 during which interviews/discussions were held at NASA HQ and ten NASA Centers. In October and December, three Workshops were conducted.
- Participating NASA Centers: Ames, Dryden, Glenn, Goddard, Langley, Kennedy, Jet Propulsion Lab, Johnson Space Center, Marshall, Stennis
- Each Center assigned a representative to coordinate their Center's support to this task. Task support was uniformly good across all Centers. There are good people at all NASA Centers. They want to make FBC work. The same goes for industry and academia.
- Center/HQ visits and Workshops addressed these task objectives:

- **Define FBC**
- **Establish Rules of Engagement for FBC**
- **Identify good examples of FBC**
- **Identify obstacles to FBC**
- **Identify what is most important for the future of FBC**
- **Identify Center-to-Center Teaming Options**
- **Establish metrics for measuring the benefits of FBC**
- **Analyze FBC problems/failures as to lessons learned, common threads, recommended action**
- **Identify the downside to FBC**
- **Provide recommendations**

- Workshop #1 in Oct 1999, involved NASA HQ and Centers, focused on objectives 1-10 above
  Workshop #2 in Dec 1999, involved NASA HQ and Centers, focused on technology
  Workshop #3 in Dec 1999, involved Industry and Academia, focused on objectives 1-10 above
- More on this Task in the Appendix and a web site that will be provided by NASA

NASA is even more important in the 21st Century

P = People



Future FBC = PTM

T = Technology

FBC requires both Entrepreneurs and Managers

FBC is here to stay

Entrepreneurs and Managers are Leaders

NASA FBC TASK

We are learning From 1st GEN FBC Missions

NASA Equates to FBC

M = Methods

FBC is a National Imperative

AJS
March 2000
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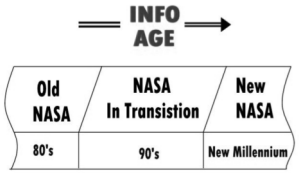
NASA FBC TASK



Summary

- Of all the hundreds of people interviewed within government, industry and academia, no one said we should discard FBC and go back to the "old ways." They felt we must work harder to make it work, to continue to make cost and schedule a part of the equation in doing government business- not only focusing on the technical
- Move over, FBC does not only just apply to NASA work, it applies to all of government, industry and academia. We must innovate and become more efficient if we are to remain a world leader and continue to compete successfully in the global marketplace - being tightly knit together into one world network as we move into this 21st Century and the Information Age

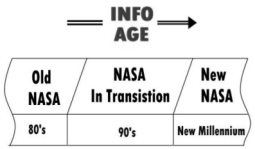
The question is: "Do we as a nation have the will to do what is necessary to succeed with FBC?

- First and foremost, FBC is about people. Leaders and teams make FBC work not words on paper or memory, and not everyone can pick up the FBC Rules of Engagement and succeed at FBC. It takes the very best, experienced people, their full dedication, and their follow through on all of the details – and still FBC Teams may fail – **SPACE EXPLORATION REMAINS A TOUGH BUSINESS**

- The future of FBC boils down to People, Technology, Methods

If we are to take FBC to a higher level, we must find ways to acquire and keep good people, do a much better job of infusing advanced technology into NASA systems, and do a much better job of incorporating new methods, especially those promised by Information Technology

NASA FBC TASK



- No turning back on FBC

NASA, rest of the nation must respond to global competitive environment

✓Must succeed in FBC to maintain world leadership

✓ FBC applies to all work within NASA, the nation

- ✓ It's both a teaming spirit and methodology
- ✓ Started with project experiments, now moving into the institution

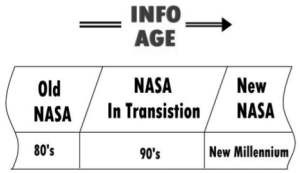
✓ NASA is in a dynamic transition from old to new

- ✓ There have been setbacks, but we are learning from mistakes/successes, must incorporate lessons learned and move on
- ✓ There are many constraints/challenges
- ✓ But there is potential for significant future payoff

Future FBC boils down to ⇨ PTM

- ✓ People – Acquire, challenge, empower good people
- ✓ Technology – Haven't yet scratched the surface on the potential of advanced technology development, especially in Information Technology
- ✓ Methods – Equipping people with advanced technology, best tools, training, processes, standards, lessons learned databases, effective checks and balances

NASA FBC TASK



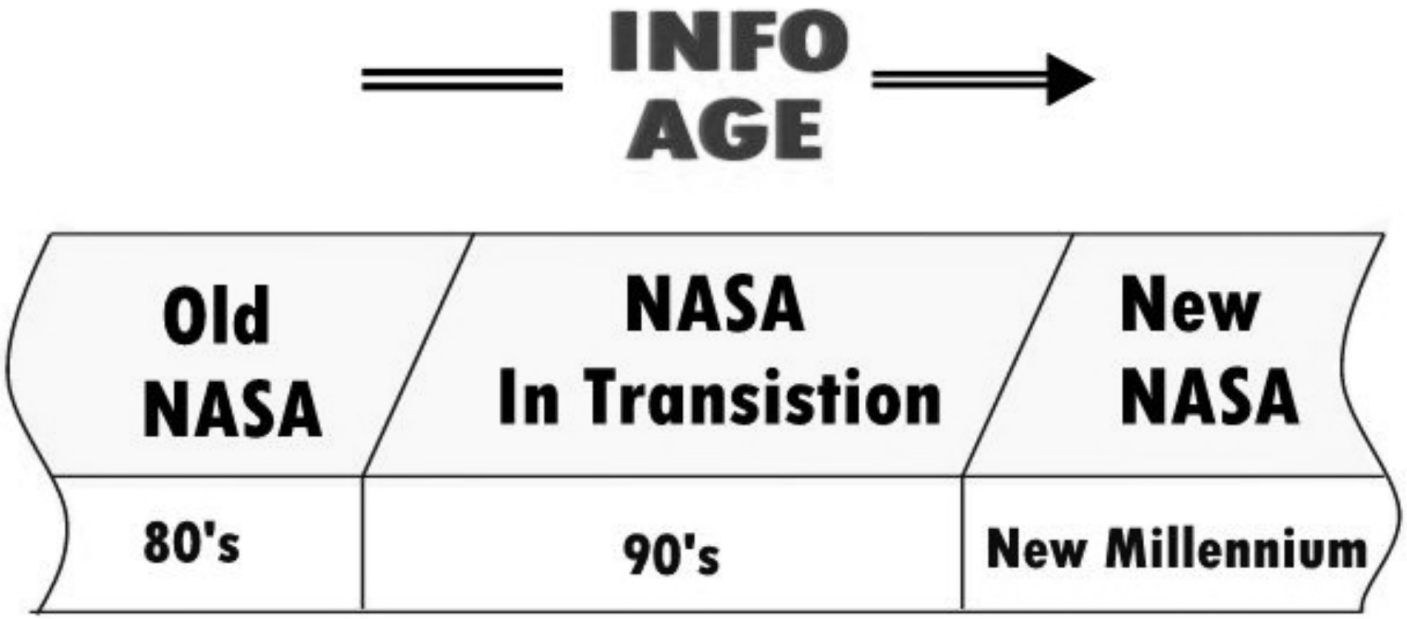
NASA in Transition

- FBC has triggered a major transition from “old to new” within NASA. What started in the early ’90’s as FBC Project experiments - Clementine, NEAR, MPF, Lunar Prospector, MGS, Lewis/Clarke, WIRE, etc. has now propagated throughout all of NASA – into all Missions, including Shuttle and Space Station, and into the institutional support base.

- This transition has put much pressure on the NASA system and its institutional support base which was not prepared fully to handle the increased workload of more missions and tighter budgets. Almost overnight, many more project teams were needed, greatly increasing the need for more institutional support - including more Peer and Independent Review Boards as well. Institutional management attention has been spread more thinly over more missions. This includes the extra institutional support needed for those missions as well as support for major re-engineering and technology initiatives.

- **In some areas, such as Mars Flight Operations and Launch and Payload services, budget has been cut too much which must be fixed.**

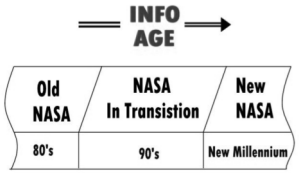
- At the same time, NASA is experiencing a talent drain due to retirements, downsizing, and the loss of people to industry. This is a major problem which will be hard to fix.



- From Few to Many Missions
- Advanced Aero-Space Technology
- New Methods – Management, Engineering and IT
- New Rocket Planes
- Shuttle and Space Station
- Next generation Observatories
- Human-Robotic Colonization

This Transition has put much pressure on the NASA System, under a declining budget, requiring more project teams, more doers and reviewers, better methods, more productivity

NASA FBC TASK



NASA's future is bright, but we have much work to do

- There is large potential for NASA in the 21st century, and NASA can be ever more important to the Nation. NASA findings could result in a profound change in our perception of ourselves.

- We have great roadmaps which plan our future visions, but in our zeal in Program planning, we have tried to do too much, too fast. We have lost sight of how difficult space exploration is and will have to slow down some with more focus on Project Implementation and Design.

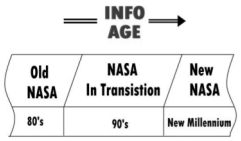
- **Currently, we have had too many mission failures which must be fixed.**

- Mission failures have been a result of mis-management, mis-engineering, breakdown in communications among Project Team members and within the institutional support base. This is often due to failure to adhere to established standards, mis-application of FBC, and by placing too much cost pressure on implementing teams. Mission failures have not been the result of introduction of new technology to flight.

- For the 1st generation of FBC Deep Space Missions, mission scope fit well within cost and schedule caps - Clemintine, NEAR, MPF, MGS, WIRE, etc. For the 2nd generation - Mars 98; Deep Space - 1,2,3,4;OP/SP; Mars 01, 03; 05 cost caps have been much more severe, placing much pressure on implementation and design.

- Better "bottom up" project planning and more realistic programs and projects must be implemented.

NASA FBC TASK



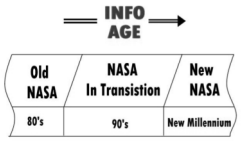
Significant Future Payoff

- **NASA goals for 21st century are a major challenge, that can produce a major payoff:**
  - ✓ Increase safety, reduce mission failure rate
  - ✓ Enable cheaper access to space, regaining LV leadership
  - ✓ Establish permanent human and robotic presence in space
  - ✓ Determine if extraterrestrial life exists
  - ✓ Spin-off crucial advanced aero-space technology, foster space commercialism
  - ✓ Protect against hazards to Earth, threats to its environment
  - ✓ Provide for monitoring of earth's environment with increasing INFO RATE
  - ✓ Open robotic space exploration to many segments of society – universities, industry, developing countries, others
    - With powerful NANO – Spacecraft and Mobile Tracking Stations at drastically reduced cost – Near Earth and Deep Space
  - ✓ Maintain nation's air flight leadership
  - ✓ Lead in Information Technology implementation and networking
  - ✓ Improve mission design and implementation productivity with advanced computer aided databases and tools with significant visualization capability
  - ✓ Bring the adventure and excitement of Remote Space Exploration into "IMAX like" visual domes and people's homes

NASA's goals capable of profound impact, NASA will become an even greater factor in maintaining the nation as a world leader – economically, spiritually

S/C = Spacecraft **LV = Launch Vehicle**

NASA FBC TASK



Definition of FBC

With the preceding as an introduction and summary, we now turn to the definition of FBC:

- There has been much debate over which should come first. Should it be Better, Faster, Cheaper instead of Faster, Better, Cheaper etc.? Similarly, there has been much debate over "you can have any two, but not all three of FBC, pick any two." These have been healthy and important exchanges, but reduce to only academic exercises when you consider what FBC is really all about.

- FBC is simply a willingness by leaders and teams to step out on new ground, to take risk, increase performance, make breakthroughs, innovate and become more efficient. It's a "state of mind," teaming spirit, and a methodology. It's an attitude by individuals, leaders, and teams- that they can do the job, are excited by the challenge, that they are willing to take risk on exciting endeavors; and that they are willing to be held accountable - in success or failure. Team members, empowered by an enlightened but strong leader, reach out beyond their individual responsibility to look after each other, working together as a closely knit team toward the larger, common goal. FBC Teams follow an approach, a methodology that comes natural to them, the "FBC Rules of Engagement" which they automatically follow.

All people should be in a FBC mode from Human Relations to Human Space. Are you? Take steps!