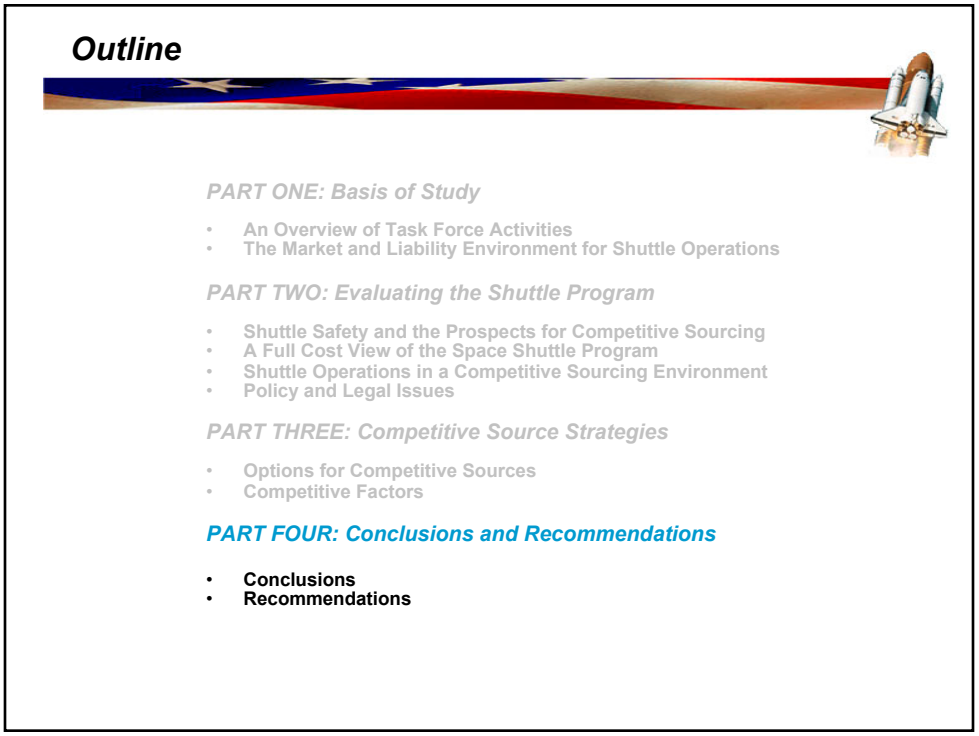
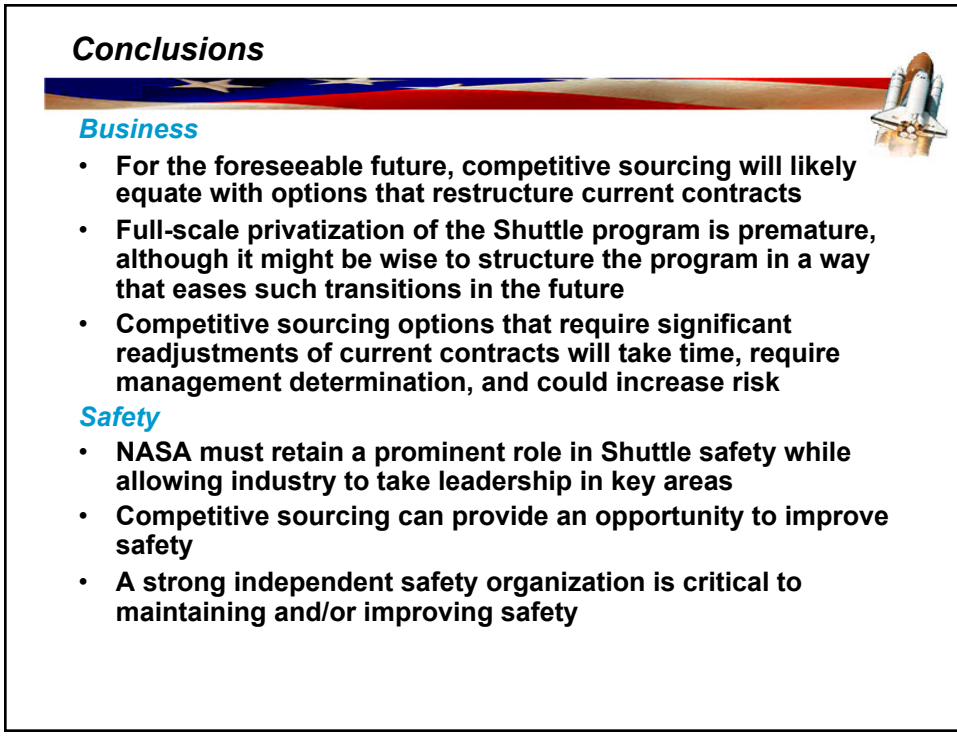
PART FOUR

CONCLUSIONS AND RECOMMENDATIONS



The following sections present the Task Force's conclusions and recommendations for NASA.



CONCLUSIONS

The Task Force was challenged to examine the Shuttle program and develop options to accomplish the various goals of a commercial sourcing initiative. These goals had various, and sometimes contradictory, intentions, which will require NASA to weigh the importance of these goals and to employ consistent evaluation criteria during deliberations.

Business Implications

The Task Force concludes that NASA should pursue competitive sourcing in one form or another. Addressing the challenge of competitive sourcing will have a profound impact on NASA and the future of the civil space program. NASA set out on a path of greater reliance on the private sector when it first conceived SFOC. Agency managers undertook this important step knowing that ultimately NASA must be willing to relinquish operational roles as soon as practical in order to pursue the high-risk, high-payoff missions at which it has long excelled. Admittedly, the Space Shuttle is an imperfect instrument for commercial operations. The system is exceedingly complex, the risks are high, and the post-*Challenger* operational environment is more cumbersome than originally envisioned

by agency planners. The private sector can, however, succeed in this environment if competitive sourcing is methodically initiated. This requires determination on the part of both the government and the private sector.

It is unlikely that a privately operated Shuttle will succeed in generating new demands for Shuttle services. The system is simply too expensive and complex to attract fledgling commercial space ventures. It is possible that some limited demand might emerge from commercial and other government sources, however, in the near-to-mid-term the primary source of demand will be supporting ISS.

The lack of demand and associated limited income streams will make it difficult to consider the transfer of assets to the private sector; at least at full value. Privatization, if NASA should choose to pursue such a course, will be based on asset transfer at deeply discounted prices. It is unlikely that privatization, as a competitive course, will be a future option for the Shuttle program.

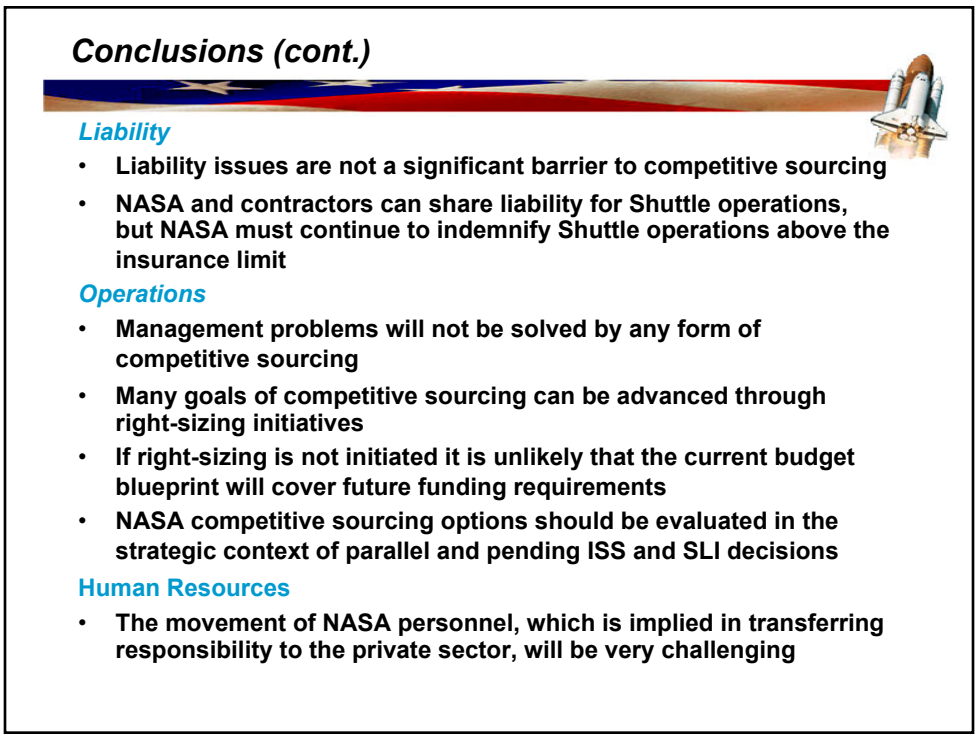
Other options for competitive sourcing require restructuring of existing contracts. The Task Force presented four such formulations, each with advantages and disadvantages that NASA will have to weigh carefully. The supplier environment surrounding the Shuttle program is currently noncompetitive. The bulk of Shuttle contract spending flows to Boeing and Lockheed Martin, an effective duopoly in this supplier base. The barrier to entry into the Shuttle market is quite high and the payoffs limited given likely contract options. Further, it is unclear, given the current limited number of options, that what little competition can be generated will lead to improved efficiency and cost reduction.

A classic response to existing market forces and operational realities would be for NASA to establish a space authority to operate the Shuttle and future human transportation vehicles. Authorities have many forms and can be so designed as to accomplish many of the goals of competitive sourcing. An authority, though it is based on the creation of a corporate instrument, might not be viewed as a "competitive" action in the spirit of reliance on the private sector. A space authority could, however, be an important first step on the way to the privatization of human space transportation when demand grows.

Safety

Maintaining a focus on safety is paramount during this transition. NASA must retain a prominent role in Shuttle safety while allowing industry to take leadership in key areas. The private sector can successfully operate

the Shuttle safely. Both NASA and the private sector can share launch authority and private firms can retain some liability for processing and launch operations. The Task Force recognizes the importance of this re-ordering of responsibilities, but these actions reflect the true nature of risk. Overseeing this transition, and assuring that safety is paramount, should be an independent safety office.



Liability

Liability issues are not a significant barrier to competitive sourcing. NASA and private contractors can share liability for Shuttle operations, though NASA must continue to provide liability indemnification above available coverage.

Operations and Governance Structures

Any of the competitive sourcing options that the Task Force has prepared for NASA will take time to implement and will require close interaction with the private sector. NASA cannot quickly restructure the Shuttle program to be consistent with competitive sourcing practices. First the agency must embark on a period of right-sizing to match the expected launch rate, and realign the management structure to more closely match a form that private firms prefer. The first step is providing the program office with the greatest latitude possible in designing and initiating new structures. To address private sector concerns and to seek guidance on procedural steps, the program office should work closely with the management of commercial firms, opening a dialog for exchanging ideas on how best to secure efficiencies and ensure that safety is maintained,

and hopefully improved, during the transition. The Task Force expects stiff internal resistance to change, particular from field center managers whose staff and program allocations will be impacted by this significant change in strategy. NASA leadership must aggressively step forward to guard this transition and to elucidate plans that ensure that field center core competencies are retained to support future programs.

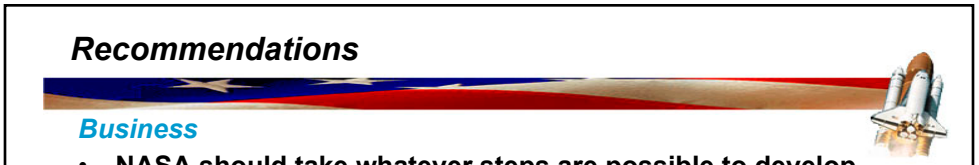
The Task Force purposefully did not focus on the many structures of governance available to NASA for implementing a competitive sourcing strategy. NASA's first task is to select an option that will constitute a new relationship between the government and the private sector for the Shuttle program. The options presented by the Task Force were designed to bound the problem, outlining broad structural boundaries for the NASA/industry interface. NASA senior managers will need to weigh the goals and selection criteria the Task Force has presented and make a final decision that meets current and future requirements. Only then can governance structures be selected that most effectively implement the chosen competitive sourcing strategy.

Human Resource Concerns

Perhaps the greatest challenge to competitive sourcing are the human resource concerns within NASA. For many options, competitive sourcing requires a substantive transfer over time of functions currently performed by civil servants. Transferring employees to comparable positions in the private sector will be very difficult. NASA must begin to analyze now the options for employee redistribution, and identify new and challenging career activities for individuals being displaced by competitive sourcing initiatives.

Concluding Observation

Competitive sourcing is a key element in a strategy of redesigning NASA for the future. Yet, it is one of many new initiatives that will reshape the agency and must, therefore, be sculpted within a strategic setting. Future launch vehicle decisions, new strategies for utilizing and operating the Space Station, and plans for the commercialization of space, are examples of parallel initiatives that will impact, and be impacted by, the path selected for competitive sourcing.



RECOMMENDATIONS

The Task Force recommends that NASA carefully review the competitive sourcing options and weigh the benefits of transitioning lead responsibility for Shuttle operations out of NASA. Competitive sourcing offers many advantages to NASA that could prove compelling when evaluated within a strategic context of options for developing next-generation launch systems, the operations and utilization of the Space Station, and future human exploration initiatives. NASA's leadership should consider creating a structured decisionmaking process within which these broad strategic choices can be analyzed.

These recommendations are directed to NASA management. While many competitive sourcing options will require the support of the White House and Congress, the immediate steps that must be taken are largely up to NASA. The recommendations are described in the following seven sections.

Selecting Options

Implementing a competitive sourcing strategy will take time, as the process requires detailed planning to maintain safety and to ensure cross-program integration. In down-selecting competitive sourcing options for further consideration NASA should:

- *Create a small working group of senior managers to evaluate and select options.* Members should be selected from the Office of Space Flight, Office of Safety and Mission Assurance, Office of the Chief Financial Officer, Office of Aerospace Technology, and the Office of the Administrator, to review and select competitive sourcing options. Additionally, since human resource management is expected to be a major consideration in a competitive sourcing strategy, the group should include a member from the Office of Human Resources and Education.
- *Select a subset of competitive sourcing options for additional review.* Review the goals and selection criteria for competitive sourcing and weight them in terms of relative importance to NASA. Study the strengths and weaknesses of the various options and apply the evaluation criteria to select a smaller menu of alternatives.
- *Ensure close cooperation with industry.* Prepare a mechanism for the working group to interact closely with senior industry leadership to exchange ideas and ensure that both government and private sector officials voice concerns.

Program Restructuring

Restructuring of the SSP is an important corollary and prerequisite to competitive sourcing. An important first step is the consolidation of SSP contract, personnel, and facility authority to the Space Shuttle Program Office at NASA JSC. This first step facilitates the complex job of right-sizing the program with some degree of isolation from internal NASA politics that would otherwise stall such an initiative. To begin the process of program restructuring, NASA should:

- *Place authority and responsibility for SSP contracts within the program office*. One reflection of this shift would be transferring SSME, RSRM, and ET contract authority from MSFC to the Shuttle Program Office at JSC. As part of competitive sourcing, NASA should then plan to transfer responsibility for hardware procurement out of the agency in a stepwise fashion.

- *Ensure that the civil servant workforce supporting the SSP should be accountable to the SSP.* Adjustments in organizational structure should be considered to provide SSP ownership of workforce and project management (performance evaluation, awards, etc.).
- *Replicate a single company structure where field center personnel provide support directly to the SSP*. Project management and supporting workforce currently operating within a matrix management system should be transitioned to a direct reporting structure.

Business Development

Although the Task Force concluded that creating demand for Shuttle services will be very challenging, it is important for NASA to do everything it can to reach new customers. Generating commercial interest in the supplier base is equally important. To build new business externally and internally, NASA should:

- *Take whatever steps are possible to develop the market.* This includes creating a modest marketing initiative within the Shuttle program, creating an aggressive pricing policy for customers with limited budgets, and reinvigorating outreach programs. NASA should examine the advantages of combining this marketing initiative with similar activities within the SSP.
- *Empower the contractor with Shuttle operational authority to aggressively pursue new opportunities and offer significant rewards for success.* This includes retaining the majority of earnings from the provision of Shuttle services above a predetermined base.
- *Consider making "human spaceflight" the target of competitive sourcing vice the "Space Shuttle."* This should broaden interest in the program and possibly entice new firms to consider competing for operation of the Shuttle.

Maintaining Safety

Pursuing competitive sourcing should always remain focused on improving safety. This requires government/industry teamwork and pathways of open communication. To stay focused on safety during competitive sourcing, NASA should:

- *Demonstrate a willingness to accept the private sector playing a leading role in Shuttle safety.* This means the demonstration of confidence in

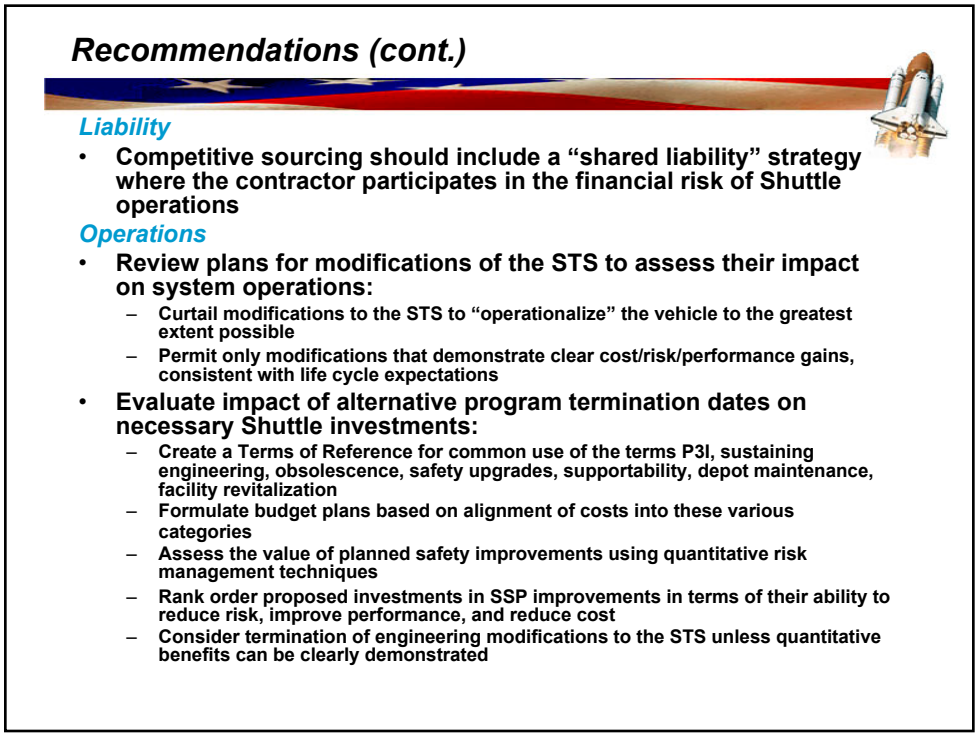
private-sector capabilities, as well as a clear statement of expectations. NASA should be willing to help train private-sector staff in critical skill areas to ensure that capabilities are built in where needed.

- *Establish an Independent Safety Assurance Office.* The ISAO should be an entity separate and apart from both NASA and the Shuttle operational contractor. The ISAO should remain insulated from subjective performance evaluations and other factors that could deter independence. NASA should evaluate federally funded research and development center (FFRDC) and ESOP formulations as preferred governance structures for the ISAO.
- *Establish a "Three-Key CoFR" process in which NASA, the ISAO, and the operational contractor share Shuttle operational authority.* This new process should be designed to ensure a partnership aimed at joint problem resolution while requiring consensus prior to launch.

Human Resources

People have been the Shuttle program's greatest assets and NASA should ensure that competitive sourcing options preserve the workforce's ability to contribute to the program and transition to programs that are professionally challenging. It is essential that human resource planning begin early. To begin the process, NASA should:

- *Form a "transition team" to clarify personnel and skills essential to Shuttle operations.* The transition team should include representatives from the Office of Space Flight and the Office of Human Resources and Education. This team should prepare a time-phased profile for transferring Shuttle operational functions along with a plan for ensuring the transition of appropriate personnel to the private sector. A future staffing target should be established reflecting the minimum number of NASA personnel and skills needed to provide operational oversight of the program. To the greatest extent possible, this team should incorporate plans for the design and operation of future launch systems with the express goal of minimizing NASA operational staffing.



Liability

The Task Force has stated that the private sector can successfully take a leadership role in Shuttle operations, reaching an inevitable point at which government oversight of human space transportation is minimal. The first step requires that private firms be given operational authority. Commensurate with this authority is the responsibility of operating the Shuttle system with the greatest care. Some degree of liability should be borne by the private sector in keeping with this new operational authority and NASA should:

- *Include in competitive sourcing a "shared liability" strategy where the operational contractor participates in the financial risk of Shuttle operations.* Further analysis is required, but a notional level of first-party liability should be set at $250 million for damages per orbiter with the government indemnifying above this amount. Private industry could be allowed to either self-insure or purchase insurance. If the operational contractor elects to purchase insurance, clauses should be so designed as to require recovery of a set number of prior premiums in the event of damage/loss.

Operational Emphasis

As NASA transitions the Shuttle program to a competitive sourcing regime, emphasis must be placed on reducing R&D activities associated with the system—the system must be "operationalized" to the greatest extent practical. At the same time, activities currently under way to ensure that the Shuttle system remains safe must be completed, and future projects to deal with aging infrastructure and safety modifications should be thoroughly evaluated. To monitor the many aspects associated with making the Shuttle program more operational in nature, NASA should:

- *Create a Terms of Reference for common use of the terms associated with Shuttle upgrades.* This includes such terms as preplanned product improvement (P3I), sustaining engineering, obsolescence, safety upgrades, supportability improvements, depot maintenance, plant maintenance, and facility revitalization. These definitions should be condensed wherever possible and budget lines reflecting the final set of definitions should be clearly identified.
- *Prepare a long-term budget based on a comprehensive review of required Shuttle modifications.* Budget plans should be formulated based on alignment of costs into the various categories defined above. Evaluate the impact of alternative program termination dates on necessary Shuttle investments. Assess the value of planned safety improvements using quantitative risk management techniques. Rank order proposed investments in SSP improvements in terms of their ability to reduce risk, improve performance, and reduce cost. Consider termination of engineering modifications to the STS unless quantitative benefits can be clearly demonstrated.