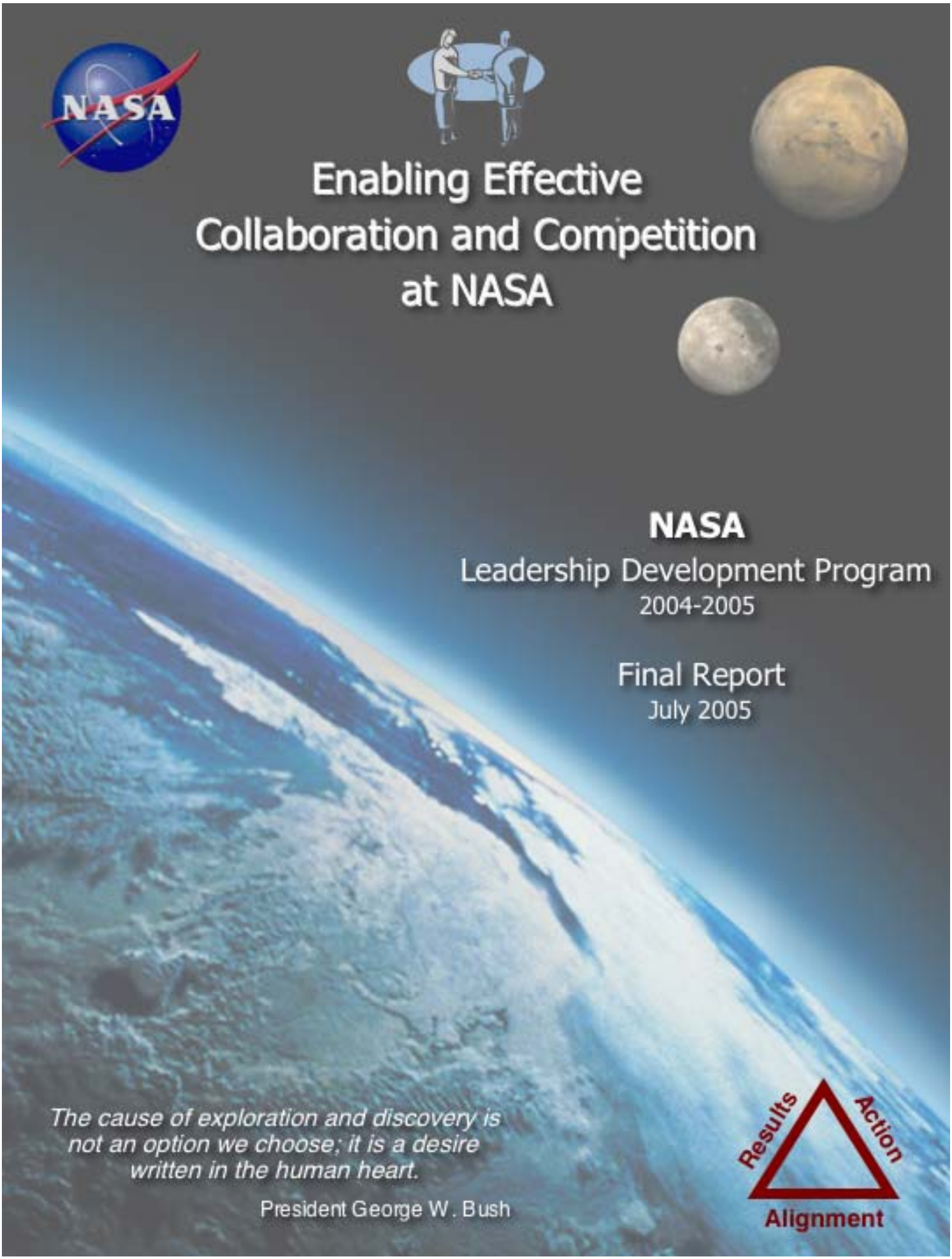

# Enabling Effective Collaboration and Competition at NASA

**NASA**

Leadership Development Program

2004-2005

Final Report

July 2005

*The cause of exploration and discovery is not an option we choose; it is a desire written in the human heart.*

President George W. Bush

*NASA*

*Leadership Development Program*

*"Developing effective leaders who align with*
*NASA's mission and vision of the future,*
*and who are dedicated to creating measurable results*
*that matter to the American people."*

## Executive Summary

This report, ***Enabling Effective Collaboration and Competition at NASA***, summarizes the work of the NASA Leadership Development Program 2004-05 Class Project. The primary goals of this effort were threefold: 1) to examine the effective use of collaborative, competitive, and directed-work environments within NASA, 2) to communicate the results of this project and thereby initiate cultural changes within the agency, and 3) to provide a meaningful leadership development experience for the project participants. All three of these primary goals have been (or are in the process of being) met.

In this report, the specific project goals and objectives are discussed along with the general approaches employed to fulfill these objectives. Following this, the results of this work are described including the following: a taxonomy and methodology for graphical and textual business models development, tools and processes to be used for the generation of business case analyses regarding competed or directed work allocation approaches, a ***NASA Collaboration Handbook*** documenting the principles and best practices for effective collaboration, and a roll-out plan for communicating these results across the NASA workforce.

There are four central recommendations resulting from this work:

- NASA should define a standardized, concise business model approach for illustrating and explaining organizational funding and requirements flows, lines of functional authority, and work distribution across the Agency.
- NASA should develop and keep current business planning processes and tools appropriate to assist managers with making structured, strategic decisions regarding competed and directed work approaches.
- NASA should better educate its workforce in the principles and best practices of effective collaboration and provide senior management support for an environment in which collaboration can succeed.
- NASA should develop an agency-wide communication strategy to explain the rationale, impacts, and strategies for all key business decisions, thereby increasing workforce "buy-in" and enhancing implementation of these decisions.

Each of these recommendations has attendant findings and observations reported within the text and a compiled listing of project lessons learned is provided to help guide future endeavors similar in nature to this project. Further, Appendices are attached providing detailed approach, result, and product descriptions for the several facets of the overall project.

With regards to the goal of this project providing a valuable leadership development experience, this was met through the fact that this project formed a continuous backdrop and proving ground for the various aspects of the overall educational experience of the NASA Leadership Development Program. Truly, the two are interwoven and inseparable.

## Class Participants

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# Enabling Effective Collaboration and Competition at NASA

NASA Leadership Development Program

2004-2005

## Introduction

### Topic Background

The National Aeronautics and Space Administration (NASA) is a large, complex government organization spanning ten field centers and a headquarters location, distributed geographically across an entire continent and spanning a broad gamut of technical and scientific endeavors. The current incarnation of the NASA functional organization is based upon four mission directorates dedicated to the specific mission areas of Aeronautics, Exploration, Science, and Space Operations, plus many institutional, support, planning, and administrative organizations. Further, each field center has its own unique culture and organizational structure intended to support the umbrella goals and objectives of the agency, but tailored to the specific needs of that support role. There are themes and programs and projects and technical organizations and support organizations and oversight groups based upon hierarchical or matrix models or some hybrid mixture of both. In short, NASA does not have a single "way of doing business."

Previous NASA organizational structures were similarly as complex and diverse as the current one. Future structures will be just as complex as well. Considering the breadth and depth of the purposes and goals of the agency, this complexity will remain an inevitable and intrinsic reality. Yet within the context of this apparent jungle of organizational lines of authority and responsibility, NASA has a fundamental responsibility to function efficiently and effectively. This is particularly true in light of the renewed energy, enthusiasm, and excitement behind the expansive goals of the National Vision for Space Exploration. If NASA is to truly fulfill these goals for the exploration of space, then it must find ways to better understand and optimize organizational elements within this intrinsic web of complexity.

The NASA Leadership Development Program (LDP) Class of 2004-05, composed of NASA employees from eight different field centers plus Headquarters, undertook as its year-long class project an examination of particular facets of the ways that work is accomplished within NASA. Specifically, the LDP 2004-05 Class grappled with the interplay between three distinct features: competed work, directed work, and collaborative efforts across the agency.

It is important to recognize that all three of these features of how work is or can be accomplished within NASA have their potential benefits. Indeed, it is the desire to gain and maximize these benefits under different circumstances that causes the discussion regarding this subject matter to be ongoing and vibrant. The following lists provide some top-level highlights.

Competitive work is good because it can:

- Leverage the best capabilities both inside and outside the agency
- Create productive and innovative energy
- Build discipline in planning and accounting
- Drive overall cost effectiveness

Directed work is good because it can:

- Reduce the time, effort, and cost of initiating work
- Provide for support of long-term, strategic technology development
- Create a sense of stability and security within the agency workforce
- Allow for the direct maintenance of critical core capabilities

Collaboration is good because it can:

- Create synergies within the agency
- Open future opportunities via awareness of capabilities of collaborating partners
- Build trust between collaborators
- Reduce duplication
- Maintain affordability and sustainability
- Build OneNASA credibility

## Project Evolution

The original title for the LDP 2004-05 Class Project was "Roadmap to Optimized Competition and Collaboration at NASA." The motivation for pursuing this subject area began, and remained to a large degree, twofold. First, there was the sincere and abiding desire of every class member to help ensure the success of NASA in the pursuit of its goals. The challenge of distributing work across the agency in a fair and wise manner through a balance of competition and collaboration seemed instrumental in ensuring mission success. Second, there was a common concern and desire to address the high levels of tension and uncertainty observed from different vantage points across the agency. This tension and uncertainty was the result of the cultural and organizational transformations taking place as the agency sought to adapt itself to the National Vision for Space Exploration.

The LDP 2004-05 Class was recognized from the beginning that it was undertaking an area of examination not entirely amenable to typical scientific or engineering study, particularly within an agency as large, diverse, and complex as NASA. To a certain degree this fact was reflected in the sometimes contentious, sometimes meandering discussions and directions taken by the class throughout the course of the year. It was only by remaining tenaciously dedicated to the original motivations and consequent top-level goals of the project, while simultaneously remaining flexible enough to allow for necessary course corrections, was the class able to produce results. Greater focus was eventually achieved thanks in large part to coordination and collaboration with the project executive sponsors and with other organizations within NASA. Thus, as more was learned and understood about the subject matter, the title for the project evolved to become, ***Enabling Effective Collaboration and Competition at NASA.***

## Customer Definition

The ultimate customer of the LDP 2004-05 Class Project is NASA. It was intended that the results of this project could be used by people throughout the agency for the benefit the entire agency. The direct, identified customers of this project were its NASA executive sponsors:

- Ms. Mary Kicza, Associate Deputy Administrator for Systems Integration
- Mr. Jim Jennings, Associate Administrator for Institutions and Management
- Admiral Craig Steidle, Associate Administrator for Exploration Systems Mission Directorate

The goals, objectives, and activities of the LDP 2004-05 Class Project were coordinated with these executive sponsors and with related agency-level activities, notably the OneNASA Competition Working Group. Continuous alignment of the objectives of this project with the goals of the agency was accomplished by periodic executive sponsor briefings throughout the course of the year.

## Goals and Objectives

The structure of the requirements flow-down for the LDP 2004-05 Class Project followed that of a formal project within the agency as defined by standard systems engineering practices. First, goals were established. From these goals, specific objectives were laid out. From these objectives, requirements were defined that effectively dictated the form and functional elements of the overall project. As the execution of the project progressed, some of the subsequent objectives and derived requirements were shifted to better align with changing and evolving project direction. It is important to note that despite the acknowledged evolution of the direction of the project, the overarching and broader goals remained largely intact. This report documents the list of final project goals and objectives. In Appendix F, details are presented regarding where and how these goals and objectives may have shifted and evolved over the duration of the project.

**Goal 1:** Develop business models and supporting business cases that optimize NASA Mission Directorate use of collaboration and competition.

Objective 1.1: Produce a ***NASA Collaboration Handbook*** that defines collaboration principles and describes collaboration best practices.

Objective 1.2a: Develop a standardized method and taxonomy for the generation of business models describing organizational structure including means for illustrating and describing competed work, directed work, and situations of collaboration.

Objective 1.2b: Develop a business model data-collection template to support the collection of organizational information that can lead to the generation of organizational business models.

Objective 1.3: Develop tools to be used in the generation of a business case for a particular circumstance that would enhance the application of the elements of competed work, directed work, and collaborative environments.

Objective 1.4: Develop draft example business models representing agency mission directorates and other organizations that accommodate each organization's uniqueness.

**Goal 2:** Communicate the project findings to both NASA senior management and the NASA workforce.

Objective 2.1: Develop a NASA-wide roll-out plan.

Objective 2.2: Present results to NASA management.

Objective 2.3: Present project results and messages to at least one audience at each center.

Objective 2.4: Integrate findings and recommendations into NASA Transformation activity (e.g., One NASA).

**Goal 3:** Project will provide a significant leadership development experience to the LDP 2004-05 Class.

Objective 3.1: Ensure that at least 33% of class has taken on a task or project leadership role for project.

Objective 3.2: Ensure that at least 50% of class has made an oral presentation for the project to a project sponsor.

Objective 3.3: Ensure that at least 75% of class feels they have met this goal.

## Approach

### Approach Considerations

The LDP 2004-05 Class considered, and discussed at length, a number of ways to approach this effort, and each method can be viewed on a spectrum with relative benefits and risks. However, there are attributes associated with successful initiatives which remain common, irrespective of the specific method employed.

1. Formal Project Management — It was necessary to establish a framework to manage scope, timeline, and resources formally and transparently to avoid the unexpected. Establishment of a project plan, formal milestones, roles and responsibilities, and project processes were all critical elements in delivering expectations. It was also crucial that the class had the ability to refine the deliverables, process, and personnel aspects of the project as the project requirements unfolded.

2. Speed with Purpose — The pace dictated by the imposed timeline (complete by July 2005) required a brisk pace of decision-making. The framework of the project and the process for decision-making needed to be flexible and adaptive to ultimately provide a means for gaining consensus for decision. This was critical to the success of the effort.

3. Integrated Effort — Project success required the integration of strategy, process, people, and to some degree, technology. This implied a highly integrated and cooperative team

environment with broad participation. It also required the leveraging of work previously completed or in progress such as the excellent accomplishments of the LDP 2003-04 Class and the OneNASA Competition Working Group.

4. Business Requirements — Efforts initiated with a definition of business objectives, clear measures of success in terms of familiar business outcomes, tend to have higher success and user buy-in. Consequently, it was decided in the area pertaining to business case analyses that traditional approaches should be used, as much as possible, to bring additional credibility to the project.

5. This is a Change Initiative — This project was recognized to be among the first stages of a change initiative involving people and processes. A wide body of evidence has emerged in recent years that reiterate that the majority of implementation failures occur for reasons associated with definition of the vision, process management, and people transition, and that only rarely is the failure attributable to technological failings. The class, directly and indirectly, sometimes with forethought, sometimes only retrospectively, made us of John P. Kotter's well known *"Eight Stage Process of Creating Major Change."* Kotter's work establishes a framework of eight stages for change initiatives. These stages are: 1) Establishing a sense of urgency, 2) Creating the guiding coalition, 3) Developing a vision and strategy, 4) Communicating the change vision, 5) Empowering broad based action, 6) Generating short term wins 7) Consolidating gains and producing more change, 8) Anchoring new approaches in the culture. (John P. Kotter, ***Leading Change***, Harvard Business School Press, 1996).

Throughout our initial planning, the LDP 2004-05 Class believed that incorporation of each element above into any chosen strategy would improve the probability of a successful outcome.

## Project Organization and Management

Figure 1 shows the organizational structure for the LDP 2004-05 Class Project. At the top are the executive sponsors and the LDP Manager Christine Williams. From these individuals the project received authority, direction, and guidance throughout the year.

The fundamental structure is based upon consideration of the topic areas of the project. This led to the establishment of four task teams: Collaboration, Business Models, Business Case, and Communication. The leadership positions of these task teams as well as the overall leadership of the project were all rotating positions to be changed at the various LDP workshops throughout the year. There were several purposes for this leadership approach. First, because this project falls under the auspices of a leadership development learning experience, it was considered important to expose as many individuals as possible to leadership roles. Second, these changes allowed the class to best leverage the diversity of backgrounds and experience within overall class. And third, this arrangement allowed individuals to best manage their own year-long schedules and to devote sufficient time to their rotational work assignments within the agency.

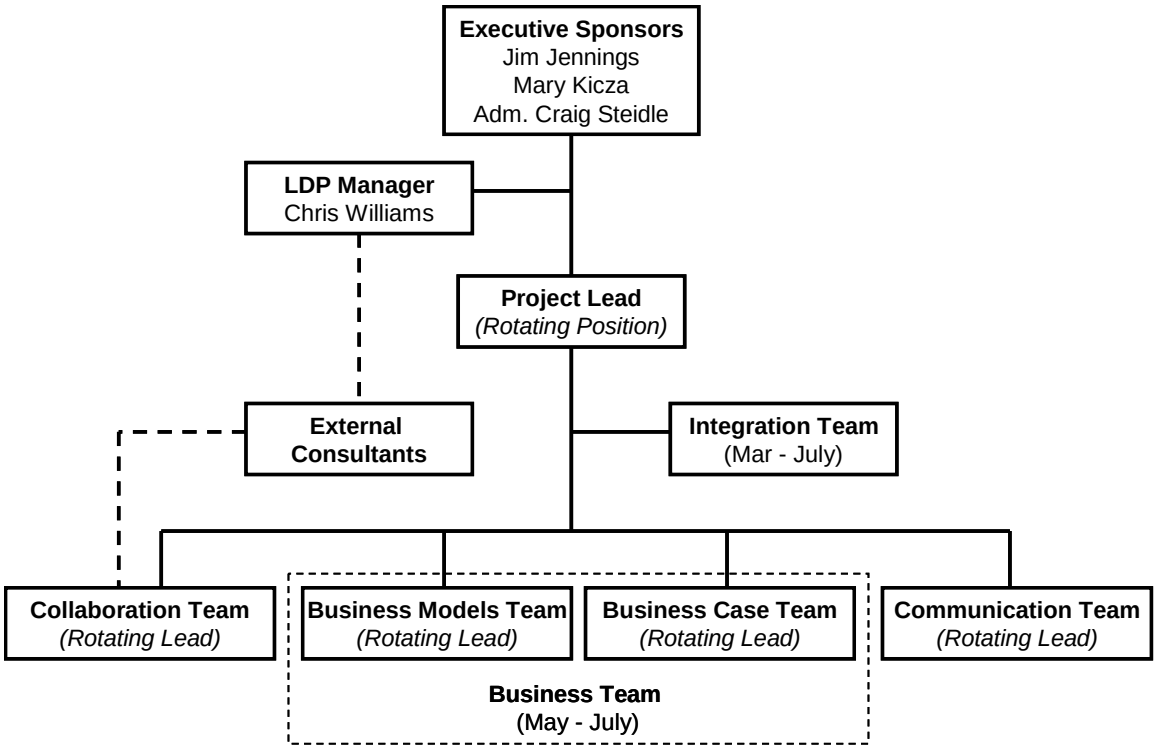



Figure 1. LDP 2004-05 Class Project Organization

The four task teams were composed of varying numbers and rosters of participants throughout the project life cycle as the needs of the efforts varied and as individual's interests evolved and changed. While this was occasionally a source of discontinuity or slowdowns in progress, more often than not it further allowed for the diversity of the class to be brought to the forefront as its greatest strength.

Temporally, across the schedule of the project, the management of the project and the work accomplished can be broken into three phases as illustrated in Figure 2.

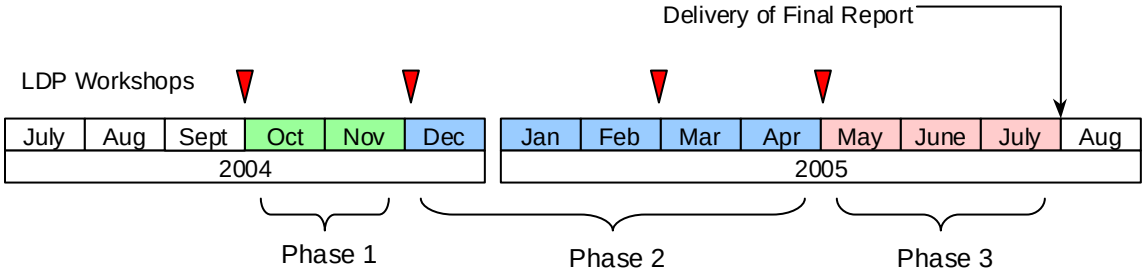



Figure 2. LDP 2004-05 Class Project Overview Schedule

## Phase 1 – Establishing the Foundation

The LDP 2004-05 Class Project began in October 2004 with the establishment of several exploratory committees to investigate topic areas including the formation of a preliminary project plan. It was at the LDP workshop in early December 2004 that the general provisions of the project plan were modified and adopted, including the original versions of the

overarching goals and objectives presented above, project element timelines, and estimated necessary resources. Further, during this phase a collaborative internet website dedicated to this project was established to facilitate communications and data exchange.

All LDP class projects are encouraged to obtain an executive sponsor thereby providing for an authoritative link to the goals and requirements of the agency. The executive sponsor is responsible for providing overall guidance to the project team, identifying and addressing system issues that can either facilitate or impede the process, and eventually serving as a strong advocate for the project recommendations at all levels of the agency. The broad scope of the LDP 2004-05 Class Project warranted input from multiple viewpoints and so three executive sponsors were engaged covering the areas of strategic planning, institutional and human capital management, and the pursuit of the objectives of the National Vision for Space Exploration.

Class discussions throughout the year created a deeper understanding of what the team wanted to accomplish within the project. This meant that the team had to be flexible and to adjust the scope as needed. It was extremely important to document the project requirements, including performance requirements and success criteria, and log all of the necessary changes. This effort was initiated during this first phase of the project. After defining these requirements at a high level, each task team was responsible for breaking them down into incremental steps. As the project developed, the class continually re-evaluated how well the project was meeting the requirements.

### Phase 2 – Fulfilling the Goals

Once a consensus project plan was adopted and the project organization was established, the real work on the project began. Due to the calendar of LDP workshops, the rotation of the leadership roles, and the migrations of the various team rosters, this phase can be broken into two pieces, but throughout both pieces this was when the primary research and work was accomplished by the task teams. Midway through this phase a preliminary Integration Team was established with two Deputy Project Leads functioning as its members. It was during this phase that the collaborative interaction with the OneNASA Competition Working Group came into being.

Each task team was responsible for collecting relevant facts, concepts, or benchmarking data to support a logical and credible process for meeting their requirements. This was especially true for the Collaboration Team in their structured efforts to collect statistically valid data from across the agency.

With regards to the work of the Business Models Team, a business model is traditionally a description of the method of doing business by which a company can sustain itself, that is, generate revenue. It is a framework that relates the different forms of a product line approach to an organization's business context and strategy. The LDP 2004-05 Class chose to modify this notion slightly since the government is not in business to make money, but nonetheless desires to be efficient. The class applied this modeling method to define the processes that NASA programs and projects use to accomplish their mission.

Likewise, a traditional business case is a structured proposal for business improvement that functions as a decision package for organizational decision-makers. A business case usually includes an analysis of business process performance and associated needs or problems, proposed alternative solutions, assumptions, constraints, and a risk-adjusted cost-benefit

analysis. Ultimately, a business case analysis sets out the information needed to enable a manager to decide whether to support a proposed project, before significant resources are committed to its development. The core of the business case is an assessment of the costs and benefits of proceeding with a project. For the LDP 2004-05 Class Project, the Business Case Team examined analysis processes and tools that would provide best value decisions for the government.

The Business Case Team specifically pursued the development of tools to focus on a core decision point within the overall formulation of a larger business model. This decision is that between competed and directed work allocation methods. The analysis process and tools are intended not only to evaluate the procurement process, but also the related components of project success including services, research support, and retaining core competencies.

The LDP 2004-05 Class as a whole conducted brainstorming exercises to identify ways to effectively convey the results of this project to NASA management and the NASA workforce. The work of the Communication Team drew upon and built upon these ideas. A significant portion of this work was the acknowledgement of the importance of employing listening skills and displaying openness to ideas and thoughts from across the agency. To continue to be relevant, this project will need to evolve with the ever-changing and complex business processes and organization of NASA and this is particularly true in the area of communications.

Please note that detailed technical approaches for the various elements of the project are presented in the dedicated Appendices A through D.

**Phase 2A: Leadership (December 2004 – February 2005)**

- Project Lead: Bryan Biegel (ARC)
- Collaboration Team Lead: Liz Bauer (JSC)
- Business Models Team Lead: William Greene (MSFC)
- Business Case Team Lead: Jean Rogers (GRC)
- Communication Team Lead: Vicki Crisp (LaRC)

**Phase 2B: Leadership (March – April 2005)**

- Project Lead: Robbie Hood (MSFC)
- Deputy Project Lead: Andrew Keys (MSFC)
- Deputy Project Lead: Stacy Counts (MSFC)
- Collaboration Team Lead: Terry Jackson (SSC)
- Business Models Team Lead: Mark Loomis (ARC)
- Business Case Team Lead: Steve Craft (LaRC)
- Communication Team Lead: Monte Goforth (JSC)

## Phase 3 –Communicating the Results

The final phase of the LDP 2004-05 Class Project involved completing the work that had been initiated during Phase 2, finalizing task team products, generating the Final Report, and settling upon the material to be communicated within NASA regarding this project. In order to better accomplish these tasks, some changes were made to the structure of the project organization. First, the Business Models and Business Case Teams were merged to form a single Business Team. This allowed for maximum communication and coordination between these related areas. Next, the Integration Team was expanded to function as a working group adjunct to the Project Lead with the specific intent to compile and coordinate the generation of the Final Report and related materials.

During this phase, the team assembled all project information and completed a set of final overall recommendations for NASA to consider. Communication with the executive sponsors to confirm that the project had fulfilled its goals essentially authorized and encouraged the dissemination of the project results to a wider audience within the agency.

Further, beyond the immediate scope and schedule bounds of the project, the class learned that to ensure long-term success, project recommendations must be implemented in a visible, controlled and orderly fashion and that this effort requires tracking and monitoring. Consensus must be built and maintained among customers and stakeholders on specific changes designed to better meet national needs. In other words, an ongoing effort must be initiated to instill new values, attitudes, norms, and behaviors within NASA to support new ways of doing work and overcome the resistance to change. Along these lines, an important element of the communication process within this phase was the identification for parties responsible for carrying this work forward within the agency.

**Phase 3: Leadership (May – July 2005)**

- Project Lead: William Greene (MSFC)
- Deputy Project Lead: Pravin Aggarwal (MSFC)
- Collaboration Team Lead: Tom Berndt (ARC)
- Business Team Lead: Vicki Zanoni (SSC)
- Communication Team Lead: Mabel Matthews (HQ) / Monte Goforth (JSC)

## Summary of Results

All three of the primary project goals have been (or are in the process of being) met. Discussion of the fulfillment of each of these goals and subsequent objectives (listed on Page 3) are contained below.

### Goal 1: Business Elements and Collaboration

Based upon the work of the LDP 2003-04 Class Project as documented in ***Enhancing Mission Success in the 21st Century Through Collaborations***, the Collaboration Team created the ***NASA Collaboration Handbook*** defining essential collaboration principles and best practices (See Appendix C). Further, the statistical database for the documentation and evaluation of these principles and best practices was augmented, lending even further validation to this body of work. This effort has fulfilled project Objective 1.1. One of the recommendations for this project as documented in the following section is that NASA should consider making the ***NASA Collaboration Handbook*** an official agency document.

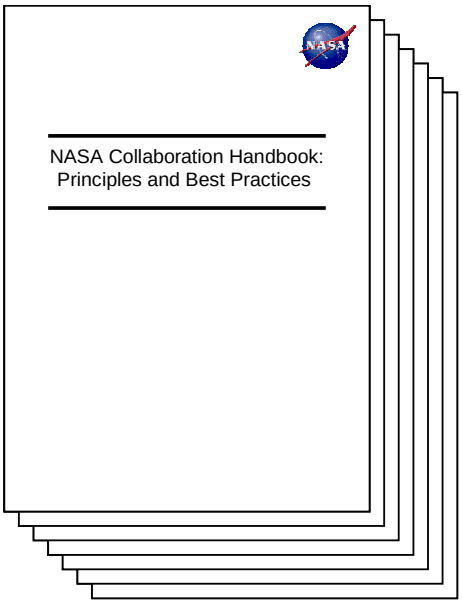



Figure 3. The ***NASA Collaboration Handbook*** (See Appendix C for full text)

In order to better understand work allocation practices, funding methods, and requirement flows for different organizations within NASA, a taxonomy and template for graphically and textually modeling different organizations within NASA was developed. This methodology for business model generation was then applied to a variety of different organizations to illustrate the multitude of different structures existing just within the upper echelons of the agency. See Appendix A for more details and an example in Figure 4 below. This work has fulfilled project Objectives 1.2a and 1.4. The LDP 2004-05 Class recognized as this work progressed, however, that a great deal more work in this area is both possible and advisable if the potential benefits of business modeling are to be fully realized by the agency.

Project Objective 1.2b, the creation of a template to be used in the collection of material to validate the material to supporting the business model for a given organization was accomplished through coordination with the OneNASA Competition Working Group (see Appendix A). Working within the structure of what was for the Competition Working Group Action #2, the Business Models task team took the lead in the creation and dissemination of the data collection templates and the instructions necessary to complete these templates.

**Business Model for Exploration Directorate**
**Prometheus Nuclear Systems and Technology Theme (FY05)**

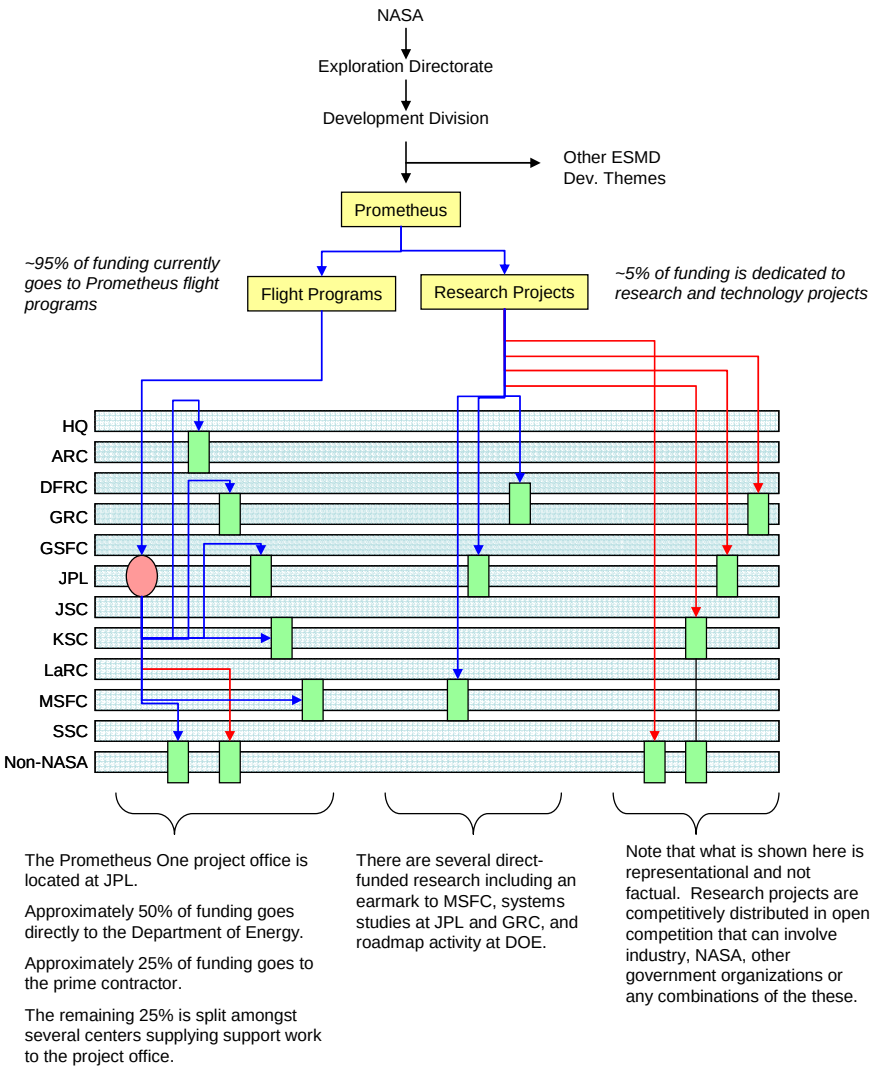



Figure 4. Example Business Model, Prometheus Theme within the Exploration Directorate, FY05 (See Appendix A for more details)

Project Objective 1.2b, the creation of a template to be used in the collection of material to validate the material to supporting the business model for a given organization was accomplished through coordination with the OneNASA Competition Working Group (see Appendix A). Working within the structure of what was for the Competition Working Group Action #2, the Business Models task team took the lead in the creation and dissemination of the data collection templates and the instructions necessary to complete these templates.

Fundamentally, NASA is a government agency and not a business. There is much from the business world, however, in the areas of efficiency, effectiveness, and decision making that can be adapted and adopted for use within the governmental agency environment. For the decisions between methods of work allocation choices, specifically between competed and

directed work, different business tools were examined and evaluated as part of this project. In the end, the LDP 2004-5 Class developed tailored tools designed for application when agency managers are faced with this decision.

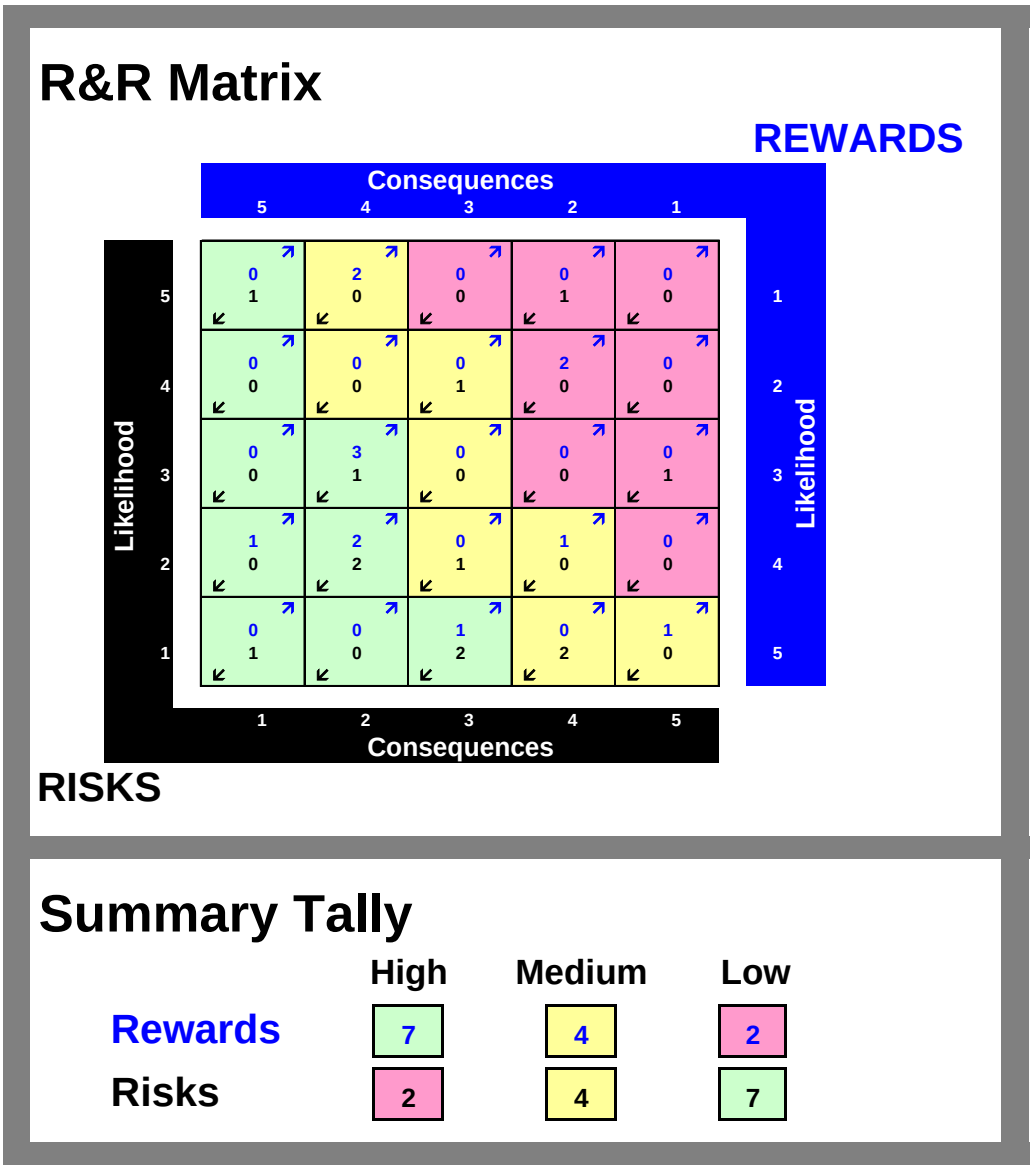



Figure 5. Example Business Case Tool element, Reward & Risk Matrix (See Appendix B for more details)

Strengths, weaknesses, opportunities, and threats (SWOT) matrices were constructed for both competed and directed work options. These, in turn led to the development of a series of Key Business Questions that a prospective program or project manager should pose. The SWOT tables and the Key Business Questions were then used in spreadsheet-based Reward and Risk Tool. This tool is an extension of well-established risk analysis methods into the realm of strategic business decision making. As a demonstration and validation exercise for this tool, a semi-hypothetical business situation was analyzed using this tool, and a simple

case study was developed around this example. The output from this case study is illustrated in summary form Figure 5 above. See Appendix B for more details. This work fulfills project Objective 1.3. Just as with the business modeling, there is much more work that could be profitably undertaken in the future in this area.

## Goal 2: Communication

The culture of an organization can be defined as "customary beliefs, social forms, and material traits" (***The Merriam-Webster Dictionary***). It is, in other words, a set of deeply ingrained characteristics. Therefore, effecting a culture change within an organization as large and diverse and geographically dispersed as NASA is a daunting task. Along this path, however, the first step is effective communication, and the LDP 2004-05 Class Project has taken several steps.

In fulfillment of project Objective 2.1, an agency-wide Communication Plan for the results, products, and Findings and Recommendations of the LDP 2004-05 Class Project has been established (See Appendix D). This work has taken into account the diversity of the NASA workforce, including the fact that NASA does not indeed have a single, monolithic culture, but at the very least eleven different sub-cultures representing the ten field centers and Headquarters. Thus, the elements of the roll-out strategies are intended to be suitably flexible and applicable to these different circumstances.

Further along the lines of pursuing the goal to instigate a culture change within NASA, several of the Findings and Recommendations refer to the continuance and extension of the work begun here including the potential development of training programs for NASA managers and supervisors. In this manner, the implementation of business modeling and business case analyses and the recognition and utilization of collaboration principles and best practices can become an ingrained part of the NASA culture of the future.

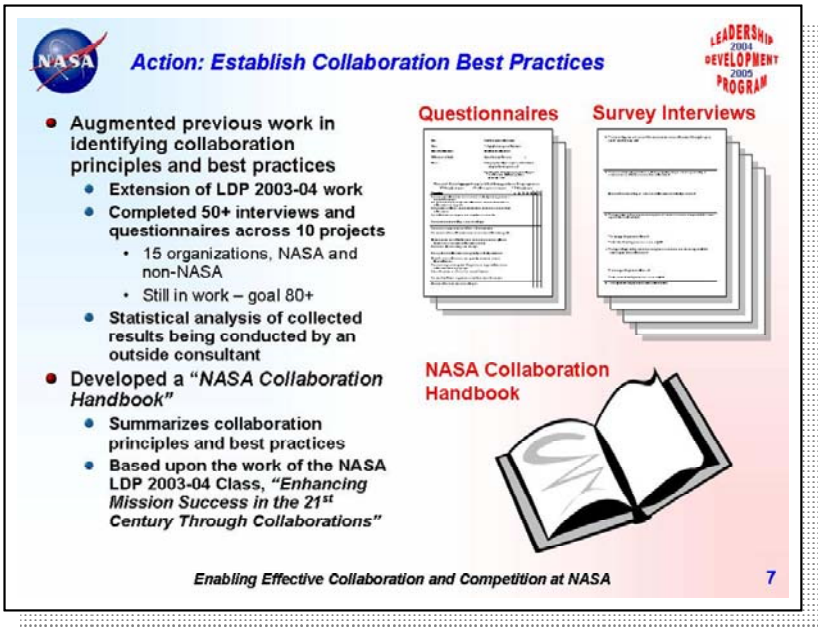



Figure 6. Sample page from LDP 2004-05 Class Project Presentation Charts

As of this writing, the process of presenting the results of the LDP 2004-05 Class Project to the NASA executive leadership is underway, and communication across the agency at the field centers by members of the NASA LDP 2004-05 Class is ready to commence, in fulfillment of project Objectives 2.2 and 2.3. The development of expanded plans along these lines is being pursued. In particular, the presentations to be made at NASA field centers will likely occur after final publication of this report.

To a certain degree, the LDP 2004-05 Class Project has already been incorporated into the OneNASA transformation activity through project coordination with the Competition Working Group (See Appendices A and B). This represents some level of fulfillment of project Objective 2.4. However, this objective will be pursued further as discussions and presentations of the results from the LDP 2004-05 Class Project continue with the NASA executive leadership.

### Goal 3: Leadership Development

Through the course of the project, due to the rotating nature of the project leadership positions, sixteen different individuals acted as task team lead, project leads, or deputy project leads. The LDP 2004-05 Class has thirty-one members. Thus, project Objective 3.1 mandating that at least one third of the class acted in a leadership position within the project has been fulfilled. Beyond these named leaders, however, there were in many cases deputy task team leads and others who rose to lead different facets of the LDP 2004-05 Class Project in unofficial roles. In this class fully composed of leaders, many led.

Project Objective 3.2 suggested that at least half of the LDP 2004-05 Class should have an opportunity to present elements of project updates to the executive sponsors. As the project progressed, it became apparent that the limiting factors with regards to this objective were the few opportunities for face-to-face meetings with the executive sponsors and the inherent scheduling constraints faced by our executive sponsors. There were not that many meetings and they were by necessity brief. Because of this, project Objective 3.2 was not fulfilled. However, through the efforts of the communication facet of the LDP 2004-05 Class Project, and under the auspices of the NASA Leadership Development Program, all of project participants will have the opportunity to present elements of the project across the agency at their home centers. In this manner, this project Objective 3.2 will be fulfilled in spirit if not in fact.

The final objective, project Objective 3.3, is perhaps the most significant in the long term despite its placement at the end of the list. The question here is simply whether the members of LDP 2004-05 class members believe that the experience of participating in this project offered a valuable leadership development experience. It is important to realize when considering this point that the LDP 2004-05 Class Project was never during the year an adjunct to the overall program. Rather, it was interwoven through all of the leadership workshops, acted as a backdrop for all of the many arranged discussions with members of the NASA executive leadership, and provided a cohesive central experience around which innumerable opportunities existed for one-on-one interactions and mentoring sessions. In short, the LDP 2004-05 Class Project was a central and ubiquitous component of the NASA Leadership Development Program experience.

As part of the NASA Leadership Development Program, participants are required to fill out a self-evaluation questionnaire when they first begin the program, just after the midway point, and at the end of the program year. The compilation of the answers provided on these

questionnaires provides a metric for the NASA LDP Manager, Christine Williams, and her staff of the effectiveness of the program. These results can also be used here as a measure of the fulfillment of project Objective 3.3. As of this writing, the most recent data available is that from the midway point of the program year as compared to the beginning. In Figure 7 there are four histograms illustrating the differences in self-evaluation scores in four significant areas. A zero on these plots indicates no change whereas a positive value indicates perceived improvement. As can be seen, while not everyone perceived improvement in all areas, in each case the tendency was towards the positive. Further, in response to the question, "Have you had opportunities to participate and contribute during your participation in the LDP?" all respondents replied in the affirmative. Based upon these preliminary results and based upon the fact that the LDP 2004-05 Class Project is such an integral element of the program, it is clear that project Objective 3.3 has been largely fulfilled.

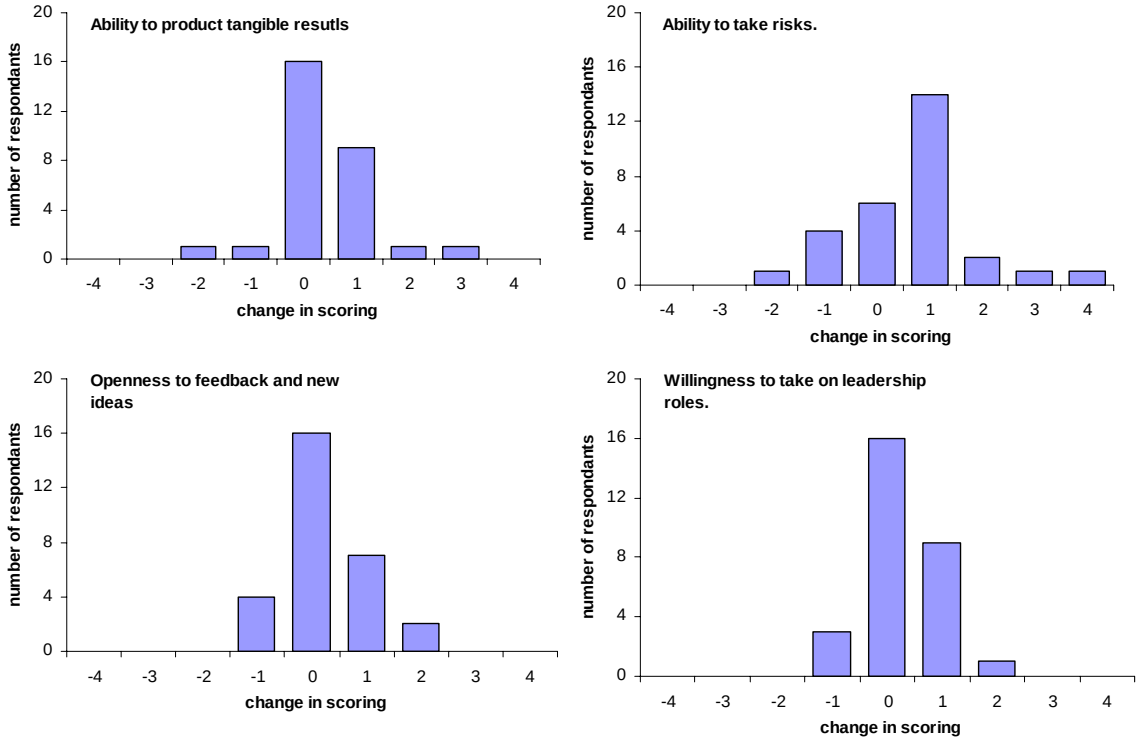



Figure 7. Responses to selected topics from NASA Leadership Development Program questionnaires – Comparison of beginning to midway point of program year.

## Findings and Recommendations

Throughout the course of pursuing the different topics of the LDP 2004-05 Class Project, a great deal of information was reviewed and a great variety of lessons were learned. As discussed above, some of these lessons even resulted in the modification and evolution of the objectives of elements of the project. Others, however, pertain to issues outside the immediate control of the LDP 2004-05 Class. These collected findings, recommendations, and associated observations for confronting and resolving these issues are presented here.

### Finding 1: Standardized Business Models

Organizations across NASA do not use a standardized, concise means for representing organizational structure with respect to funding and requirements flows, lines of functional authority, and work distribution across the Agency.

#### Recommendation 1:

NASA should define a standardized, concise business model approach for illustrating and explaining organizational funding and requirements flows, lines of functional authority, and work distribution across the Agency.

Observation 1.1:
Beyond typical organizational charts, NASA does not have a standardized business modeling approach. The adoption of a standard template for graphically illustrating and textually describing organizational structures within the Agency would have two benefits. First, it would allow for the clearer communication of Agency organizational and accountability structures to the workforce. Second, if it were properly updated on a regular basis it would provide for a clearer understanding by NASA managers of the overall environment within which they must make strategic decisions and plans for the Agency.

Observation 1.2:
The tool used for the development of the business models created for this project, a typical desktop graphics program, was too cumbersome, inefficient, and limited for the construction of business models as a regular practice. An effective and efficient modeling tool that can automatically store, organize, and present combined graphical and textual business models should be developed or obtained to overcome these difficulties. Such a tool should allow for straightforward model structure development and for the input of element attributes such as funding levels, documentation references and links, key personnel lists, and manpower levels.

### Finding 2: Improved Business Decision Tools

Current NASA policies and guidance cannot and do not address many of the potential situations that managers face when selecting competed or directed work allocation approaches.

**Recommendation 2:**

NASA should develop and keep current business planning processes and tools appropriate to assist managers with making structured, strategic decisions regarding competed and directed work approaches.

Observation 2.1:
In order to implement the Agency's strategic planning guidance, NASA managers would benefit from the use of additional, specific methods and tools to assist in and understand decision-making regarding both competed and directed work allocation. Such capabilities should incorporate up-to-date lessons learned for both allocation approaches and would allow for more consistent and more transparent decision-making across the Agency.

Observation 2.2:
Performing traditional business case studies for organizations within NASA is problematic because most business case methods were not developed with government agencies in mind. Adaptable processes and tools appropriate for the Agency while still fulfilling the goals of business case analysis should be developed and implemented. Such tools might include those to assist in understanding the environments, risks, and rewards associated with competed and directed work allocation.

## Finding 3: Effective Collaboration

The NASA workforce needs to better understand the principles and best practices for effective collaboration and how they should be used to enhance mission success.

**Recommendation 3:**

NASA should better educate its workforce in the principles and best practices of effective collaboration and provide senior management support for an environment in which collaboration can succeed.

Observation 3.1:
NASA does not have a singular policy document dedicated to collaboration principles and best practices. Making the ***NASA Collaboration Handbook*** an agency policy document available through the NASA's On-line Directives System (NODIS), and keeping it updated, would be a means of providing written guidance to Agency program and project managers on ways to incorporate effective collaboration practices when appropriate.

Observation 3.2:
There appears to still be obstacles, primarily cultural, that inhibit the effective use of collaboration within NASA. Incorporating the principles and best practices for collaboration into training curriculum such as the NASA Academy of Program and Project Leadership (APPL) and NASA Engineering Training (NET) would be a long-term method for instilling these principles into the Agency workforce.

### Finding 4: Communicate Business Decisions

NASA often does not effectively communicate the rationale for decisions relating to competed work, directed work, and cross-agency collaboration.

#### Recommendation 4:

NASA should develop an agency-wide communication strategy to explain the rationale, impacts, and strategies for all key business decisions, thereby increasing workforce "buy-in" and enhancing implementation of these decisions.

Observation 4.1:
The organizational, funding, requirements, and accountability structures for the various organizations within the agency are not well understood by much of the NASA workforce. Communicating organizational business models that illustrate and explain these elements to the Agency workforce could produce a broader understanding and more efficient pursuit of Agency objectives.

Observation 4.2:
There often exists within the NASA workforce a lack of clarity regarding how business decisions are made in terms of work allocation approaches, including the use of competition, directed work, and cross-agency collaboration. Educating the Agency workforce with regards to the strategic decision-making mechanisms, the process ingredients, and the decision results would increase the "buy-in" of the workforce.

Observation 4.3:
The expertise of the Public Affairs Office and external marketing companies could be used to develop a standardized communication strategy which would more effectively communicate the processes and impacts of key business decisions and facilitate the culture changes required to implement new agency initiatives. This communication strategy should also address how to sustain the impact of any new initiatives.

## Lessons Learned

This brief section is dedicated to observations relating to the internal aspects of initiating, executing, and completing the LDP 2004-05 Class Project. The specific and most direct intended audience is future NASA Leadership Development Program classes. However, these observations are also intended to be sufficiently general as to apply to any similar project undertaking.

#### Project Leadership

- The use of rotating project leadership positions, as was done by this LDP Class, is appropriate since it provides leadership experiences for more project participants. Also, this approach leverages the energy, expertise, and interests of multiple individuals. However, there are potential drawbacks to this approach such as the resultant discontinuity and the required periods of adjustment necessary to accommodate differing leadership styles, transfer project management knowledge, and reestablish management roles, responsibilities, and relationships.

- Project leadership, when dealing specifically with a class of peers and when fighting amongst competing priorities, may not be able to sufficiently motivate the project membership to fully engage in the project activities. Some of this is representative of real life situations; some of it is not. The creation and implementation of innovative performance and participation incentives should be considered for the project from the outset.

**Project Structure**

- The LDP project team organized the project in a manner similar to common NASA projects. Initiating a project in this manner, including the development of a project plan, serves as a good focusing exercise. Nearly everyone within NASA is either implicitly or explicitly familiar with this approach, and this makes the process easier. However, care should be taken to ensure that the level of detail within the project plan is appropriate for the work being scoped, meaning that it should provide structure without hindering flexibility.
- The project plan should be a concise, version-controlled, living document updated as necessary throughout the life of the project. This provides a common source of information for those working on the project and a means for historically tracing the evolution of the project.
- For working groups where ongoing meetings are integral to progress, there is a significant advantage in co-location for effective participation. Given the difficulty with effective and comprehensive communication via teleconference meetings, membership locale should be considered when forming working groups.

**Project Communication**

- As the LDP class struggled with the use of teleconferencing to coordinate the project activities, it confirmed that, in general, face-to-face meetings are far more effective and time-efficient than teleconferences for both information exchange and decision making.
- Project meetings tend to work best when there is an agenda and timekeeper to keep the meeting on track. Further, distributing a meeting summary and action items following the meeting is effective for focusing the participants and informing members who may not have been present.
- Meetings for working groups should be held no less frequently than once every two weeks. This allows the maintenance of some momentum and reduces the amount of time spent rehashing discussions and decisions from the last meeting.

**Project Resources and Work Methods**

- This project, like many others, exhibited a tendency by project participants to over-commit with respect to resources. Over-commitment of participant time is of particular concern since everyone involved with the project will typically also be engaged in other challenging work assignments. The initial project scope should include significant resource margins, especially with respect to schedule.
- Brainstorming by a working group followed with a quick vote by the entire project membership proved to be an effective and appropriate mechanism to build consensus for working group activities that affected the entire project.

- A dedicated, secure collaborative website is an invaluable resource for the successful completion of a project staffed by geographically separated participants. Such a resource can help to mitigate the lack of face-to-face interaction by facilitating the free exchange of data and information among the participants.

## Conclusions

The NASA Leadership Development Program 2004-05 Class set before itself in the initiation of the LDP 2004-05 Class Project the bold goals of examining the broad and important topics of business-like operations and decisions, including the effective use of collaboration within NASA and the initiation of culture change through effective communication across the agency of the results of this work. The specific objectives within the context of these goals evolved as the project progressed, but the multifaceted results as documented within this report remained true to these goals.

A methodology for graphical and textual business modeling of agency organizations was developed; tools to be used for in the process of creating a business case for different modes of work allocation were created; the principles and best practices for effective collaboration were documented and further validated; and a framework for the infusion of these results into the culture of NASA was established. Beyond all of this, the experience of pursuing this project provided a useful leadership development experience for the participants.

The findings, recommendations, and observations from this work are documented in this report. All of the recommendations suggest that further work should be undertaken in order to realize the full potential benefits of the work here initiated. However, the NASA LDP 2004-05 Class is confident that it has established with this project a solid foundation upon which such future work can be built.

## Acknowledgements

A leader innovates and a leader develops. Two distinct attributes the Leadership Development Program 2004-05 class members embraced in this learning year. We have challenged the status quo of ourselves and others, always asking for more and bigger things to achieve better things.

We credit our learning experience to the leadership displayed by Chris Williams, LDP Manager; to the insights shared with us through coaching from Cindy Zook and John Riordan; to the stability and clarity of process by Maureen Dale, Tiffany Schuffert, Linda Landrus, Training and Development Division; and last but not least to the interest and support demonstrated by our project executive sponsors Mary Kicza, Jim Jennings, and Craig Steidle.

The class acknowledges the commitment of our executive sponsors during this year of transformation. Each represented critical areas within NASA and provided the class Project direction to align within Agency goals and objectives. Their interest in the LDP 2004-05 Class Project was further heightened by significant agency events and an evolving strategy to address infrastructure and workforce issues. Ms. Kicza, Mr. Jennings, and Admiral Steidle remained engaged in the efforts of the team throughout the year, thus ensuring our relevancy to current NASA issues.

The class appreciates the efforts of Maureen, Tiffany, and Linda, as they were the glue that kept the important activities and processes from going astray. The year could not have been the success it was without their help.

The class struggles to find the words that properly articulate our appreciation of the teaching provided by Chris, Cindy and John. They have provided us tools that will enable us to follow our passions and bring others along for the fantastic voyage. As the class strived to develop project concepts, as it proceeded to debate, and finally as it reached consensus for the execution of the tasks, these leaders' guidance and the skills they deployed were invaluable. The class appreciates their obvious desire to teach the lessons of experience, made apparent by their extraordinary efforts and willingness to "play all out."

Finally, the class acknowledges the commitment and interest of all NASA Senior Leadership, and especially our Center Management. There was never a doubt that these leaders are committed to the NASA Leadership Development Program. The flexibility and robustness of this program, as demonstrated by our diverse assignments and experiences, could not be accomplished without their support.

# Appendices

# Appendix A: Business Models

## Business Model Activities

### Executive Summary

The Business Models Team of the NASA Leadership Development Program (LDP) 2004-05 Class Project developed a standard business model format to graphically show how various NASA Mission Directorates and functional offices allocate work at NASA Headquarters and across the centers. The primary emphasis of this work was to show directed and competed work with narrative text to further elucidate the organization's work allocation approach. The business model diagrams can be used to communicate organizational work allocation processes, plans, and decisions. Additionally, the business models provide a "backdrop" of the current state of operations that can assist a NASA directorate, program, or project manager in understanding the extent to which the business practices are aligned with internal and external strategies, guidelines, policies, and procedures. Examples of current and proposed business models for NASA organizations are shown.

### Introduction

The previous NASA Leadership Development Program (LDP) Class (2003-04) set out to determine the best practices for collaboration with partners from government, industry, and academia, with an emphasis on inter-center collaboration. This effort was in perfect alignment with the NASA's OneNASA initiative, which intends to improve the culture of inter-center cooperation and collegiality. Simultaneously, NASA was transforming its business practices towards increased competitive, as opposed to directed, work allocation. The current LDP Class (2004-05) expressed significant angst regarding how NASA business practices could possibly include both collaboration and competition simultaneously. Concern was expressed due to previous unfavorable experiences among class members from inter-center activities or from recently responding to the Exploration Systems Mission Directorate (ESMD) intramural and extramural competitions.

The class decided to attempt to put some rigor into understanding how best to allocate work in the Mission Directorates thereby to discover the pros and cons of various business models while including the constraints of budgets and civil service workforce rules. A Business Models Team was formed to baseline the current (fiscal year 2005, FY05) and planned work allocation approaches in the Mission Directorates.

The initial Business Models Team goals were as follows:

(1) Baseline the business models in each of the Mission Directorates
(2) Validate the baselined models with the Mission Directorates
(3) Benchmark business models of non-NASA organization with similar lines of business
(4) Recommend business models based on benchmark results and NASA experiences.

It was recognized early on that each Mission Directorate operated differently due to different missions, opportunities, and constraints. For example, ESMD was not responsible to fund

payrolls of large center workforces or maintain expensive infrastructure. The Aeronautics Research Mission Directorate (ARMD), on the other hand, acted as Headquarters' Center Executive (HCE) for three centers with 3000+ civil servants who needed to be paid and, by law in FY05, was required to fund all the NASA wind tunnels whether or not they were needed to support the program objectives.

Even though the business models were different for the different Mission Directorates, it was desired to have a common business model template that could clearly and concisely describe the work allocation approach within each Mission Directorate. The common template would be useful both as a communication tool between management and the workforce and as a basis for future strategic planning activities.

Specifically, from the project plan,

> The Business Model task will baseline the competition and collaboration practices and structures of the four NASA Mission Directorates, and will benchmark similar practices and structures in several external organizations. This work will yield a series of consistently defined, descriptive, and graphical business models including a variety of collaborative and competitive acquisition and implementation strategies. The goal will be to generate models of sufficient detail and breadth to support the development of hypothetical optimized competition and collaboration business models applicable to future NASA exploration programs. Further work performed in parallel and in coordination with the optimization efforts of WBS 4.0 element, Business Case, will be to apply systems modeling concepts and tools to the various developed business models. This effort will foster a deeper, communicable understanding of the impacts and interactions of different strategic decisions and formulations.

The LDP 2004-05 Class had the distinct privilege of experiencing the rapid, confusing, dynamic, and sometimes intriguing "transformation" of the way that NASA does business. The Columbia Accident Investigation Board results, the National Vision for Space Exploration, the Aldridge Commission report, the OneNASA Competition Working Group, the NASA Core Competencies and Competency Management system, the new ESMD, a merged Science Mission Directorate, embargoed Office Management and Budget pass-back, decreasing budgets for some, RIF-rumors, buyouts, job-fairs, and a new NASA Administrator and staff all directly or indirectly influenced the thought-processes regarding how to best do business within and across the agency.

Early on, a basic taxonomy was developed and honed to graphically display how various NASA organizations allocated work. While it was trivial to baseline the FY05 process, this was initially of little interest since the agency was changing dramatically and seemingly toward a more competition-based model. The Business Models Team spent a great deal of effort trying to document how the Mission Directorates were transforming. This became difficult as some Mission Directorates were struggling with how to define a functional business approach that took into account all their constraints and aligned with the transformation of NASA.

In early 2005, the OneNASA Competition Working Group (CWG) was successful in getting a set of competition principles accepted as NASA policy. Mission Directorates and several Mission Support (functional) offices were tasked to develop plans for bringing their organizations into alignment with the new CWG Competition Principles, and each

organization assigned points of contact (POCs) to work with the CWG on this activity. The Business Models Team collaborated with CWG and agreed to help these organizations baseline their FY05 work allocation practices, and optionally to help document plans for how the organizations would align with the CWG Competition Principles. This was a mutually beneficial arrangement as the Business Models Team had already done much of the work for the Mission Directorates, and this also aligned our work with the already recognized CWG effort. This partnership was also beneficial because it identified a knowledgeable POC within each organization who would be interested in validating our business model baseline, since it was their responsibility to develop such a baseline for the CWG action.

As the year progressed, the Business Models Team decided not to benchmark outside organizations due to time constraints. It was decided instead to baseline some Mission Support offices in addition to the Mission Directorates in order to demonstrate the utility of this work within different types of organizations.

Plans for interaction with the Business Case Team also changed during the year. The original plan was for the Business Case Team to provide formal business case analysis for each recommended Mission Directorate business model. As the Business Case Team revised their plan (see Appendix B), and as it became apparent that each business model was so intrinsically unique, it was decided that there would be no hand-off or joint refinement of the Mission Directorate models based on business case analysis. However, there was substantial opportunity for cross-fertilization of the two efforts, most importantly because the two teams joined into a single team during the last three months of the project, once the Business Models Team work was largely completed.

### Approach

A common graphical taxonomy and narrative template was identified to describe each business model. Business Models Team members volunteered to analyze specific Mission Directorates (including details to the Theme and Program level) and functional offices, generally based on the team member's knowledge of, or assignment to, that organization. The responsible team members drafted the organization's business model, and then refined and validated it based on feedback from the organization's POC to the CWG and often from others within the organization.

### Results

The primary product of this task is a set of baseline (i.e., FY05) business models for the Mission Directorates. Note, however, that the Science Mission Directorate was not completed. The baseline business models are shown in the following products section. Also shown is a baseline model of the Office of the Chief Information Officer (OCIO), indicating that this business model template can be used for other organizations within NASA besides Mission Directorates. In the diagrams, competitions can include full-and-open, intramural, or extramural competitions.

The business model diagrams should be used to illustrate and communicate organizational work allocation processes, plans, and decisions. Additionally, the business models provide a "backdrop" of the current state of operations, to the best of our knowledge that can assist a NASA directorate, program, or project manager in understanding the extent to which the business practices are aligned with internal and external strategies, guidelines, policies, and procedures. Finally, the model structure and taxonomy can be used as a generic tool to

plan, understand, and illustrate future work and funding allocation methods within an organization.

**Conclusions**

A simple graphical depiction of organizational business models has been developed. Models have been developed for most of the NASA Mission Directorates and most of the Themes within those organizations and for the Office of the CIO. Current FY05 models are included in this report and in some cases proposed future models were also developed. NASA was undergoing significant transformation during the LDP 2004-05 year. Many organizations were wrestling with the pros and cons of competed and directed work. A variety of internal and external factors contributed to the development of appropriate business models. In some organizations, the debates over these issues were still raging as the LDP year came to a close. In those cases, no proposed business models could be reliably constructed or presented. However, in the cases where a proposed business model was presented, it should not be assumed that changes have not occurred since the completion of this report. It is only hoped that the principles laid out in this report can be utilized in forming future business models for work allocation.

The LDP business models are essentially only a first step in the business modeling process. More work is required to include quantitative values regarding the allocations shown, and in doing the analysis of all of the models both individually and collectively. Thus, the LDP business models could be expanded and transformed to enable a true business modeling and analysis capability. This could be done through advanced software tool development including the potential for direct connections to other existing and emerging NASA management tools and resources.

NASA Leadership Development Program 2004-05

# *Enabling Effective Collaboration and Competition at NASA*

July 2005

## Business Models

## Business Model Taxonomy

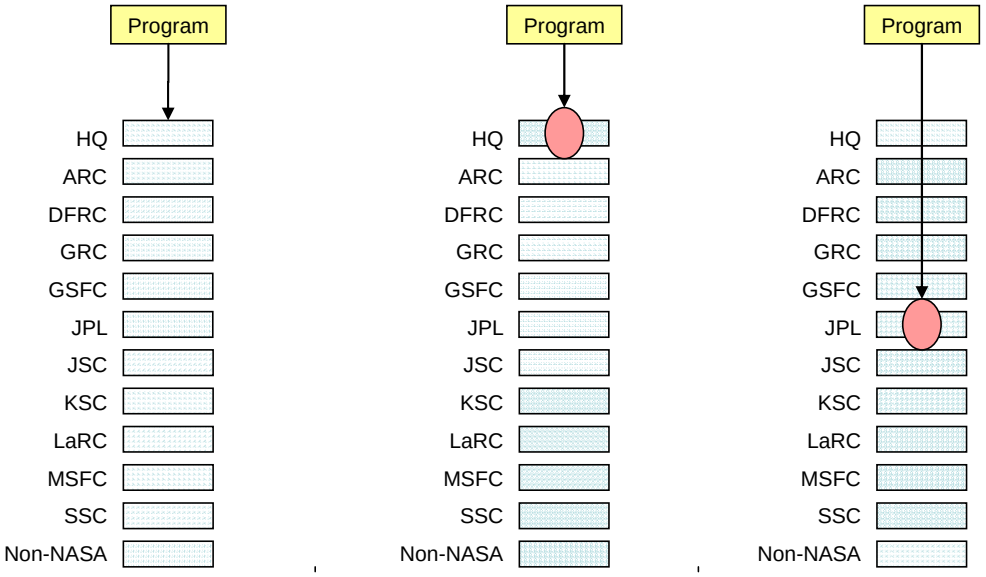
## &

## Example Models of NASA Organizations

# LDP Business Model Taxonomy

Programs and projects –

Here, the “Program” is defined as the HQ organization under which are established one or more projects. It is through these projects that most money is spent. There are, however, examples where programs themselves spend money. Also, the assumption used here is that program and project management is a NASA function.




For very small projects, there may be no ongoing project office activity beyond perhaps a single person within the program office.

Some project offices are maintained at NASA HQ. This situation most typically represents a directed work approach with regards to NASA support for the project office. Of course the project itself may then compete the work reporting to this office.

In many cases, project management is located at a NASA center. How a particular center is chosen for this could be a matter of directed work (i.e., the program office chooses a particular center) or there could be a competition between the centers for the establishment of a project office. After that initial competition, depending upon the duration of the project, this project office could effectively be funded by what looks like directed work.

Points of strategic choices:

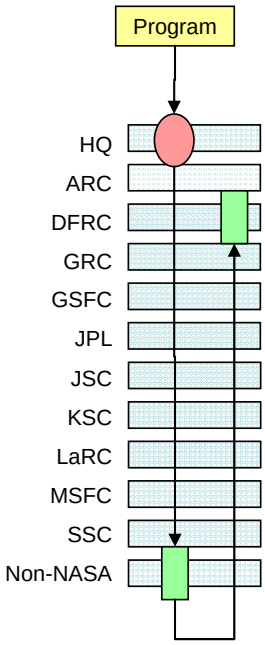
- Will a project office be established?
- Will the project office be at HQ or at a center?
- If at a center, how is that location decided, directed decision or competitive decision process?

# LDP Business Model Taxonomy (continued)

Procured Work (w/no insight/oversight beyond the project office) –

In this case, the decision is made that work will be purchased from a source outside of NASA (industry, academia, or other governmental agency). The process of making that decision could take many forms. It could be that there is a broad competition including NASA centers and outside organizations. Or, there may be justification to limit competition to only external organizations. Note that for these cases below, project management is shown to exist at NASA HQ. Obviously, this is not the only applicable project management structure.


Direct procurement of a product or service from outside of NASA.




In some cases, the outside organization can make an arrangement with one or more NASA centers in order to utilize a particular capability existing at that center.

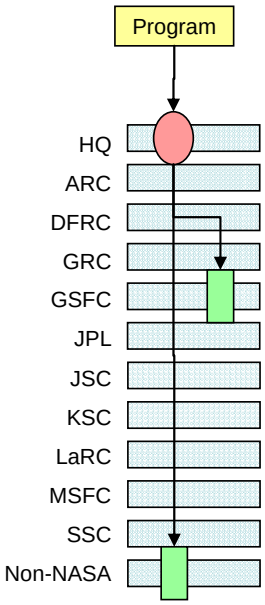
Points of strategic choices:

- Will a procurement from an outside source be established?
- If so, how will that decision be made, competition, sole-source, grant, etc.?

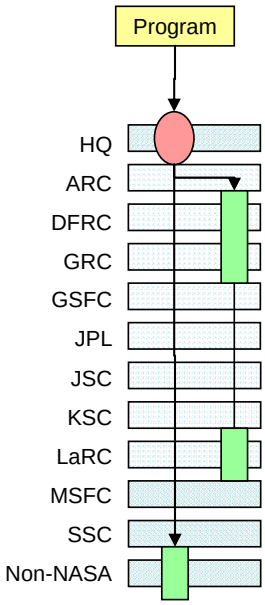
# LDP Business Model Taxonomy (continued)

Procured Work (w/ insight/oversight) –

In this case, the decision is made that work will be purchased from a source outside of NASA (industry, academia, or other governmental agency). The process of making that decision could take many forms. It could be that there is a broad competition including NASA centers and outside organizations. Or, there may be justification to limit competition to only external organizations. However, in addition to the procured work there is funded NASA work as well. Note that for these cases below, project management is shown to exist at NASA HQ. Obviously, this is not the only applicable project management structure.




Direct procurement of a product or service from outside of NASA. Plus parallel work funded out of the project office. Shown here is an example where only a single NASA center provides that NASA support to the project office. How that single center is chosen may be a matter of either competed or directed work.




Direct procurement of a product or service from outside of NASA. Plus parallel work funded out of the project office. Shown here is an example where multiple NASA centers provide that NASA support to the project office. How that these sever centers are chosen may be a matter of either competed or directed work.

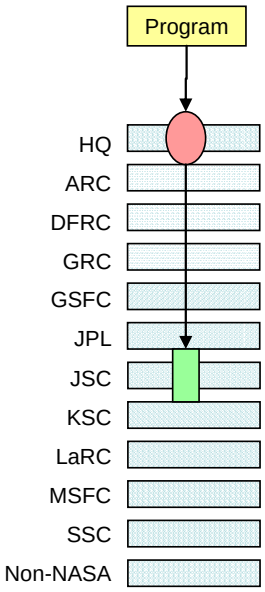
Points of strategic choices:

- Will NASA work be funded in addition to the procurement?
- If so, what will that support team look like?
- How are the funding allocation decisions made, competitive process, directed process?

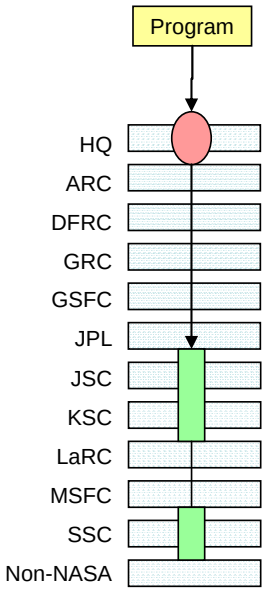
# LDP Business Model Taxonomy (continued)

In-House Work –

In this case, the decision is made to do work in house at a NASA Center. The process of making that decision could take many forms. It could be that there is a broad competition including NASA centers and outside organizations. Or, there could have just been a competition amongst the NASA centers. Or maybe the choice takes the form of directed work. Note that for these cases below, project management is shown to exist at NASA HQ. Obviously, this is not the only applicable project management structure.




In-house effort with only one NASA center supporting the project office.




In-house effort with multi-center team supporting the project office.

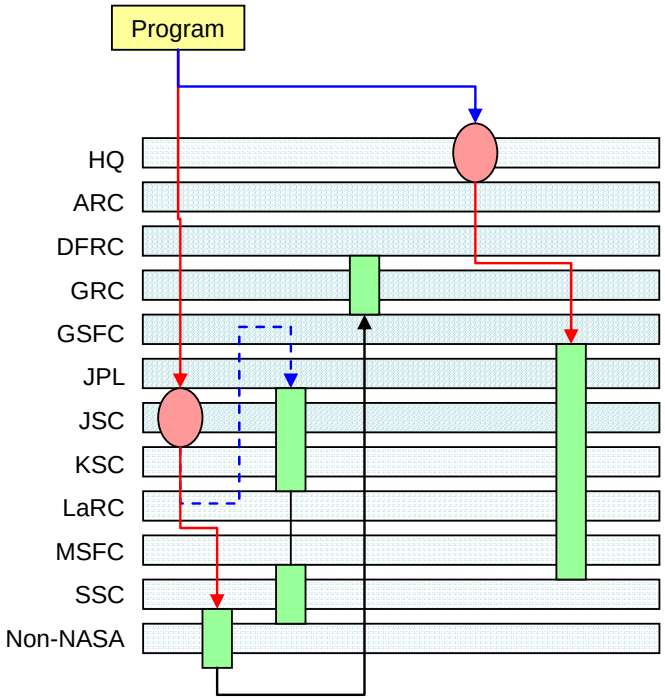
Points of strategic choices:

- How is it decided to do work in-house (versus going to external organization)?
- How is that work accomplished, single center, multiple center team?

# LDP Business Model Taxonomy (continued)

Hypothetical Example –

This diagram shows a program office with two projects. One project has a project office located at JSC. For this project, there is a direct procurement going outside NASA and a multi-center NASA effort as well. Further, there is a technical task agreement between the outside organization and GRC. The second project office is located at HQ. It is supported by a multi-center NASA team.




Line colors: In order to help identify where competition or directed work takes place, different line colors are used to illustrate differences in how decisions are made.

Red lines designate competition and blue lines designate directed work. Here, the first project office located at JSC was established in this location via a competitive process. Further, the procurement coming out of that office was decided based on a competitive process.

Blue lines designate directed work. The second project office at HQ was established via a directed work process but the multi-center NASA workforce team supporting this office was chosen based upon a competitive process.

However, the funding for NASA support work for the first project has not yet been established, hence the dashed line, but it is currently envisioned to be directed work.

The black line showing how a task agreement ties to procured work represents the fact that this agreement was established between the contractor and the center as a part of the competitive procurement and not after the fact.

## LDP Business Model Narrative Elements

- Flow down of objectives, requirements, and money allocation.
- Explain where, how, and how often (i.e., how long do projects last and are they re-competed) competitions are conducted.
- Identify specifically where decisions are made between allocating work (and funds) via competitive processes and allocating work via directed decisions.
    - Location and support for project offices (HQ or centers and how particular field centers are chosen)
    - How is the primary work allocated?
        - Directed to NASA source
        - Competed within industry
        - Competed internally amongst NASA centers
        - Competed where there is no distinguishing between NASA centers and external organizations
        - Sole-source supplier (for legacy or statutory reasons)
    - If parallel NASA work is performed (insight, oversight, etc.), how are the decisions made as to where and how that work is performed?
        - Single NASA center chosen via directed decision or competitive process.
        - Multiple-center team either created by directed decisions or competitive selection process.
- Identification of issues. For example, an issue for conducting fair competitions in a particular program area might be the way in which full-cost accounting is being done at the centers.
- Identification of constraints

# Exploration Systems Mission Directorate Models

General notes:

Internal work (civil service) versus external, contracted work – The notion is that for things that are truly unique, single-fabrication items, it is more likely to be government built though even here, should the expertise not exist in house, it is possible that a contract will be established with industry or academia. Things that involve production runs of multiple items are considered to be far more naturally amenable to contracting to industry.

Regarding competitions, it would appear today that they will continued to be in the vein of both internal and external flavors in the ESRT and HSRT themes.

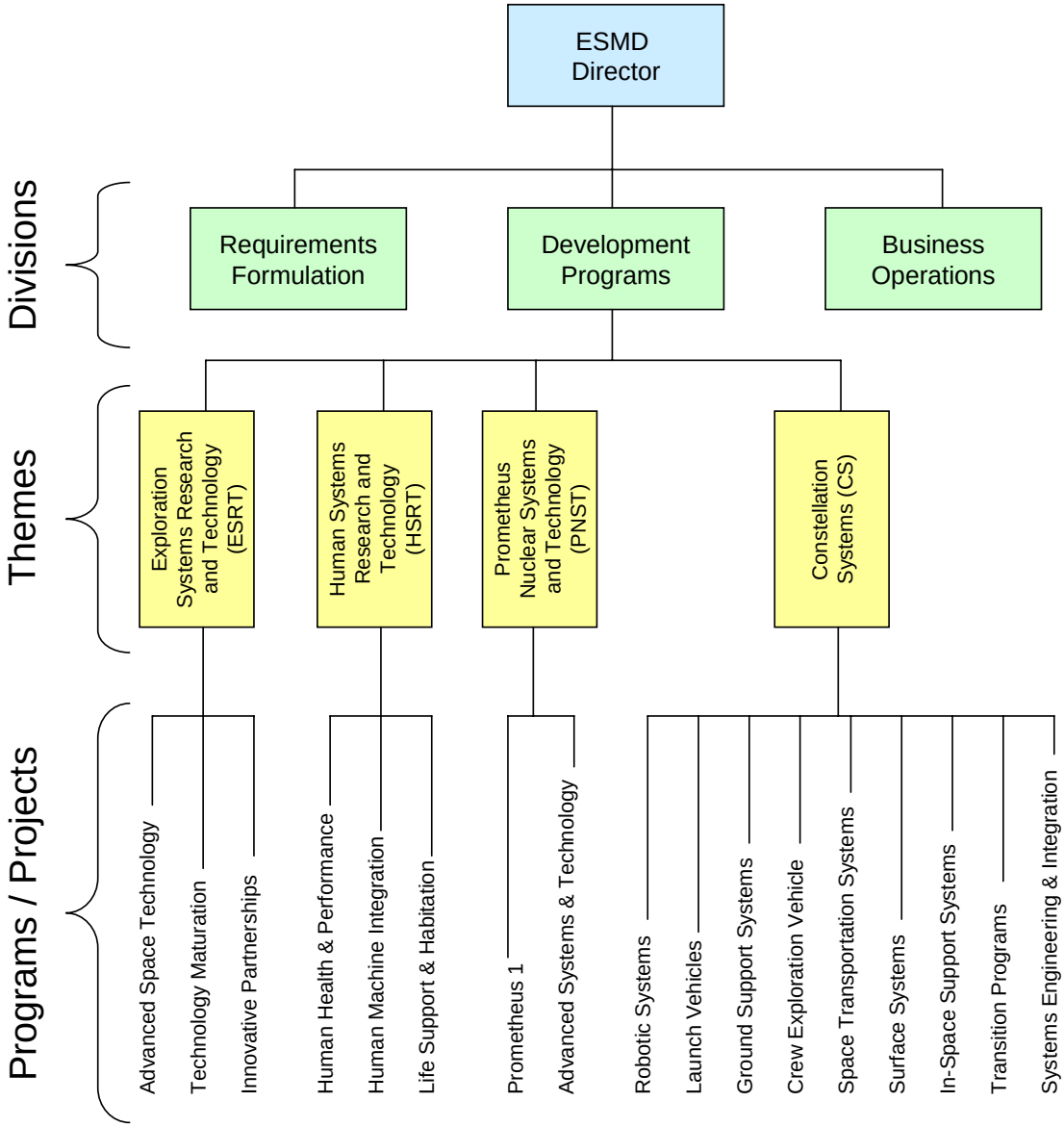
Full-cost accounting is a major issue specifically because of the way that the centers have decided (or were instructed) to implement this practice. The concept of a level playing field is something that needs a great deal of work. It does not exist now.

ESMD "owns" no field centers. This is an intentional construction designed to allow for maximal flexibility. However, there does appear to exist a nascent recognition that ESMD will have to shoulder some responsibility for the maintenance of civil service core competencies (opinions of this will likely vary widely depending who you talk to).

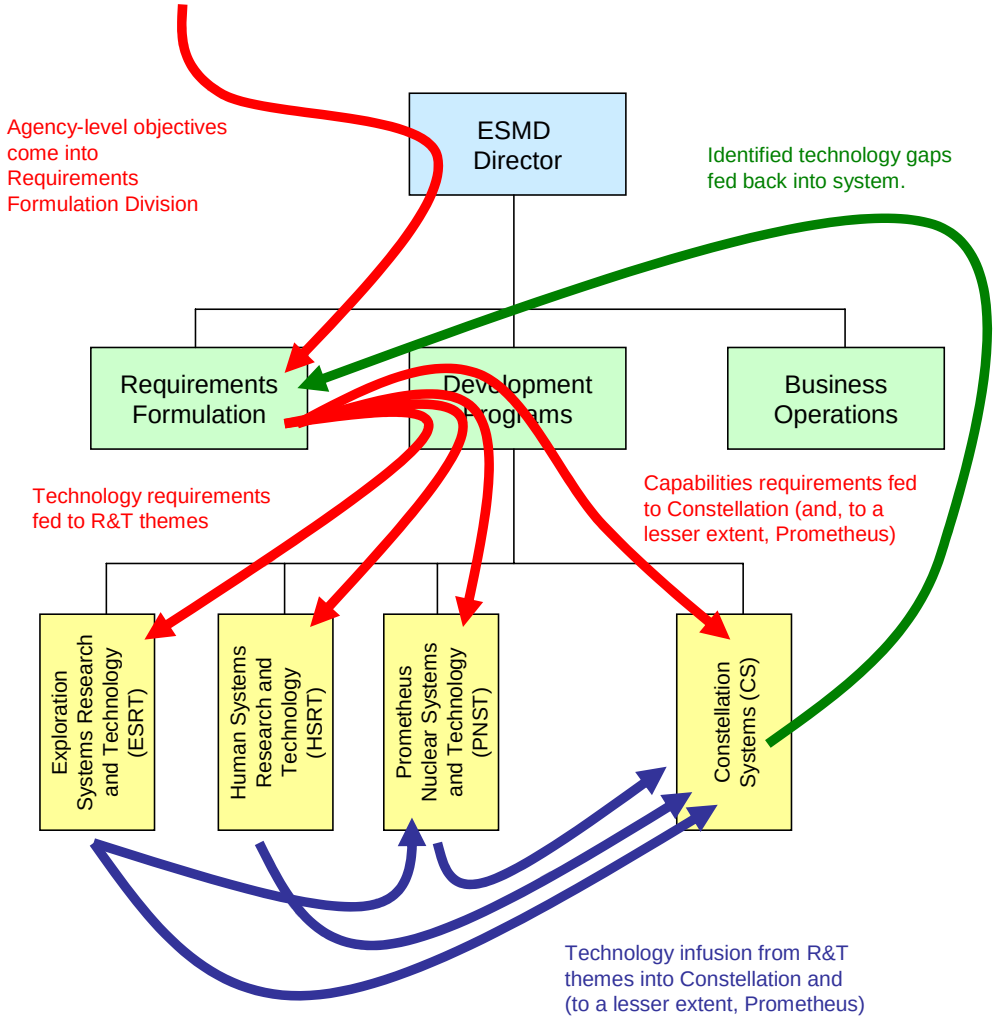
A prevailing and driving theme within and across ESMD is to find new ways of doing things. In other words, don't establish firm rule sets up front that might be difficult or impossible to live with later. Further, this is expected to be the ongoing state of affairs as the programs evolve into the future. This means that any notions of optimizing business models will have to be equally adaptable and evolvable.

This latter point regarding new ways of doing business may also apply to those areas most typically associated with directed work. Examples include the contractor oversight and the flight system sustaining engineering roles. Even here there may come to pass "creative" means of distributing work to the centers.

**Overall Exploration Systems Mission Directorate Organizational Overview**



**Overall Exploration Systems Mission Directorate**
**Technology Requirements and Infusion Flow**



## Business Model for Exploration Directorate
## Exploration Systems Research and Technology Theme

Objectives and money allocation for the overall exploration area decided at agency level.

Exploration Systems Mission Directorate (ESMD) management located at HQ must finance the fulfillment of the agency level technology objectives.

Strategic technical challenges drive the program content of the ESR&T Program.

These strategic technical challenges come from various sources and flow downward into the ESR&T Program:

**Vision for Space Exploration**
Derived from National Policy and the NASA Strategic Plan
Includes the Presidential Commission's List of Identified Technologies

↓

**Overarching Program Challenges**
Derived from ESMD Requirements and the CE&R Studies
Includes the Requirements Division's List of Identified Technical Challenges

↓

**Strategic Technical Challenges**
Derived from Constellation Systems Concepts and ESR&T Technology/Systems Analysis

↓

**ESR&T Response to Challenges**

***Advanced Space Technology Program (ASTP)***
TRL Level 2 – 4 "Technology Push" - Advanced Materials R&T
Organized by Discipline Emphasizing the Longer Term

***Technology Maturation Program (TMP)***
TRL Level 3 – 6 "Applications Pull" - Systems Demos
Organized by Functional area Emphasizing Technology Validation

***Innovative Partnerships Program (IPP)***
TRL Level 2 – 7
Organized by Program Function Emphasizing Types of Relationships

18 May 05

*ESR&T has used the **ASTP** and **TMP** to accomplish certain required technology development work.*

Initially a Request for Information (RFI) inviting submission of White Papers that addressed **Strategic Technical Challenges** facing Constellation Systems and Prometheus Systems in general, and the Crew Exploration Vehicle in particular was used. These RFIs focused on innovative approaches, including novel technologies and systems concepts, that were consistent with advances that were reasonably achievable in supporting the established ASTP & TMP milestones. (No funding was associated with this RFI.) These RFIs were evaluated and scored based on Innovativeness, Demonstrated Effectiveness/Technical Maturity, and Potential Improvement in Schedule, Cost, and Risk.

From the required technologies identified to support ESMD, ESR&T used a variety of both internal (NASA led) and external (non-NASA led) competitive methods to accomplish the required technology development work. This was done by establishing a 4-stage process to reformulate NASA's space technology investment:

Stage 1 consisted of an Internal Call for Proposals (ICP) that resulted in 1300 Notices of Intent (NOI) to solicit proposals by the NASA centers. From these NOI submissions, 137 NOIs were selected and submitted full proposals and 47 projects were selected for award. These NASA led efforts were allowed teaming members from both other NASA centers, Academia, and Industry. (100% Competed)

Stage 2 consisted of an external "Systems of Systems" Broad Agency Announcement (BAA) that resulted in 3700 NOIs to solicit proposals by the non-NASA offerors. From these submissions, 498 NOIs were selected and submitted full proposals and 70 projects were selected for award. These non-NASA led efforts were allowed teaming members from both NASA centers, Academia, and Industry. (100% Competed)

At this time no other technology development work is planned for ASTP and TMP.

*Additionally, ESR&T has used the **IPP** to accomplish other certain required technology development work.*

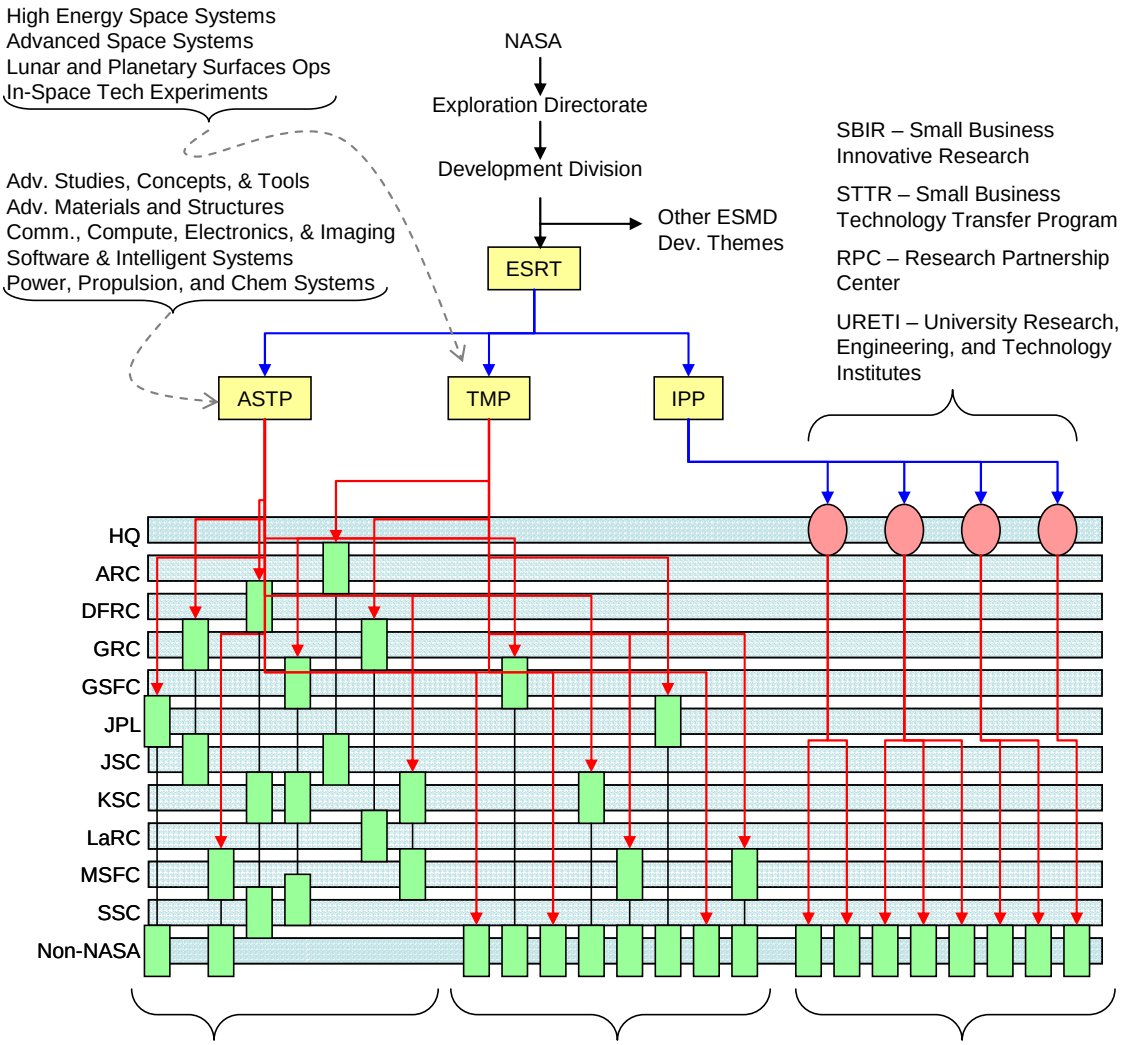
The **SBIR** Program provides increased opportunity for small, high technology companies to participate in Government sponsored research and development (R&D) efforts in key technology areas. (100% Competed)

The **STTR** Program provides an opportunity for small business to partner with a non-profit research institution to perform cooperative R&D and facilitate the transfer of technology. (100% Competed)

NASA's 12 **RPCs**, located at universities and non-profit institutions throughout the country, represent an extensive network of government, industry, and academia that leverage resources to create dual-use technologies to benefit space exploration, other NASA missions, and life on Earth. Compete under BAAs or with Centers under ICPs. (100% Competed)

**URETIs** are competitively selected proposals for university research teams with the goals of increased university role in NASA's future, cutting edge research & technology, multidisciplinary and synergistic research groups, enhanced NASA workforce, NASA-relevant educational opportunities for students, and internationally recognized centers of excellence in Aerospace Technology. (100% Competed)

## Business Model for Exploration Directorate
## Exploration Systems Research and Technology Theme




Internal Call for Proposals (ICP) involves a competitive for the allocation of funding for NASA-led research and technology projects for both ASTP and TMP. A part of the ICP has been the stress on teaming arrangements between NASA centers and between NASA centers and external entities (industry, other government agencies, and academia). What's shown here is representational, not actual. Forty-seven projects were funded with the first round ICP.

Broad Agency Announcement (BAA) solicited proposals for non-NASA-led research and technology projects for both ASTP and TMP. Teaming was allowed between non-NASA entities and NASA centers and well as between different non-NASA entities. Seventy projects were funded with the first round BAA. What's shown here is representational, not actual with regards to specific projects.

A variety of small business, technology transfer, and research partnership projects fund different research and technology endeavors.

## Business Model for Exploration Directorate
## Prometheus Nuclear Systems and Technology Theme

Objectives and money allocation for the overall exploration area is decided at agency level.

Exploration Directorate decomposes agency level technology "Level-0" requirements and passes these requirements, including research and technology requirements, through the Development Division. Prometheus is one of three research and technology themes within the Development Division and the only one dedicated to nuclear systems.

During FY05, approximately 95% of funds are dedicated through the flight program office to the Prometheus One Project. This project office for Prometheus is located at JPL. The remaining funds are dedicated to research projects and is managed out of NASA HQ.

Within Prometheus One, approximately 50% of the funding is diverted to the Department of Energy which maintains statutory responsibility for regulating the use of nuclear power within the United States. Another 25% of funding is directed to the prime contractor for Prometheus One. Of the approximately 25% remaining, it is used to support project objectives through specific tasks. The current split of support is shown, but this is not fixed and in the future may include other industrial partners or even academia. This is effectively directed work.

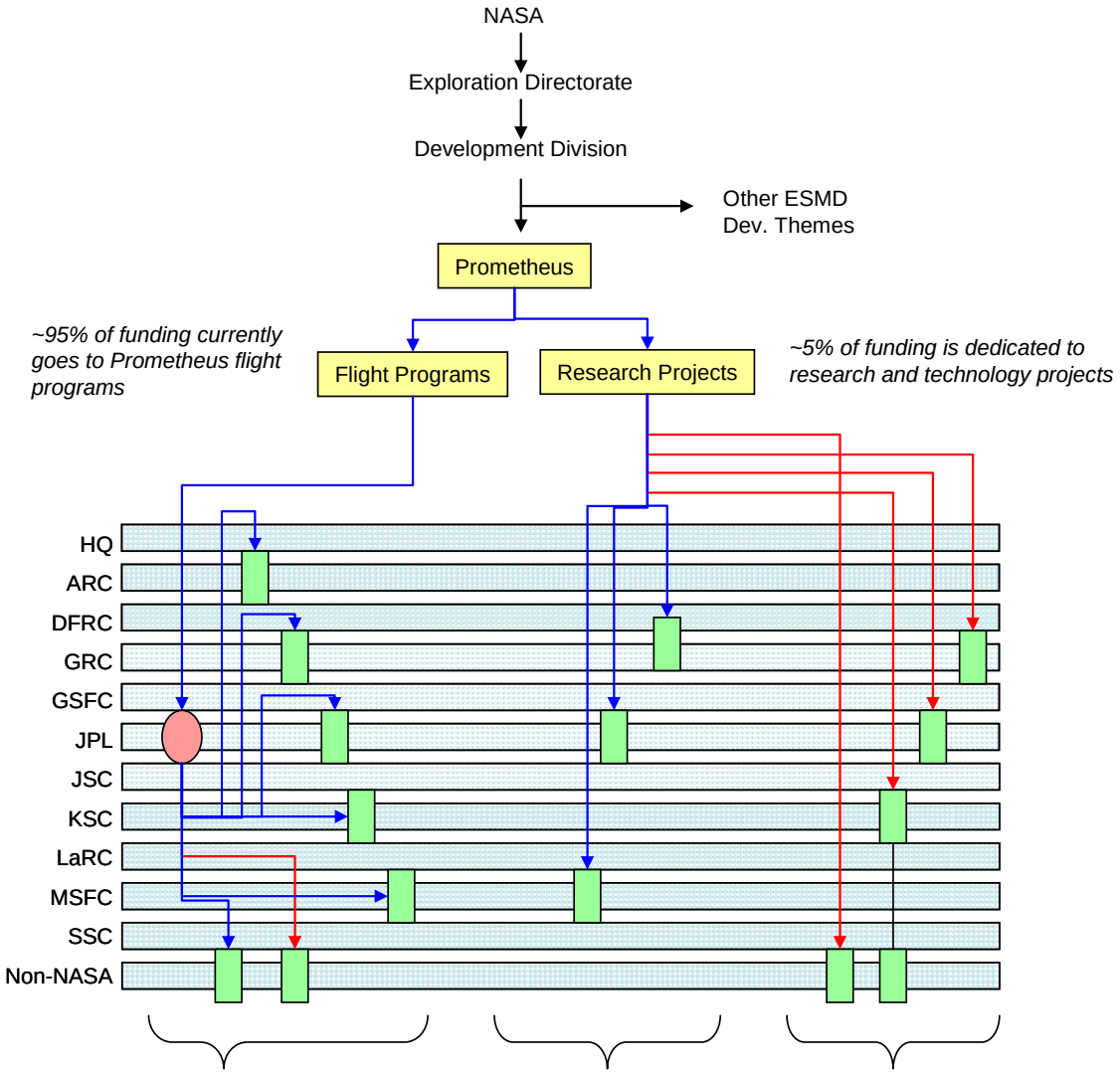
The research projects managed directly through NASA HQ are allocated through two methods. First, there are several directly funded projects including some work at DOE and an earmark to MSFC. The rest of the work was distributed open an competitive process (NASA Research Announcement) so that the projects chosen could be from NASA centers, other government office, industry, or academia.

There is virtually no institutional support funding for NASA facilities or capabilities allocated through the Prometheus Theme. Thus, the bottom line is that approximately 25% of the total outgoing funding goes to NASA centers (with about 10% to JPL). Most of that is directed work (with some implicit competition) with only a small fraction being explicitly competitive.

For FY06 (details not all clear as of 19 May 2005), the emphasis for the program will change dramatically. Rather than working towards the Prometheus One flight project, the new emphasis will be on extraterrestrial surface power systems to support the exploration initiative. It is likely that the project office for this work will be located at GRC rather than JPL (still to be determined definitively). The supporting work will likely involve a similar crew of NASA support and DOE, but whether the same contractor that was designing the Prometheus One vehicle can be used for this work or if a new competitive process will be necessary when the time comes to build mission hardware is not clear at this time.

On the research side of the house, the only thing that is known to continue is the earmark to MSFC to study nuclear-thermal propulsion. Other than that, the picture remains unclear as of this writing.

## Business Model for Exploration Directorate
## Prometheus Nuclear Systems and Technology Theme (FY05)




The Prometheus One project office is located at JPL.

Approximately 50% of funding goes directly to the Department of Energy.

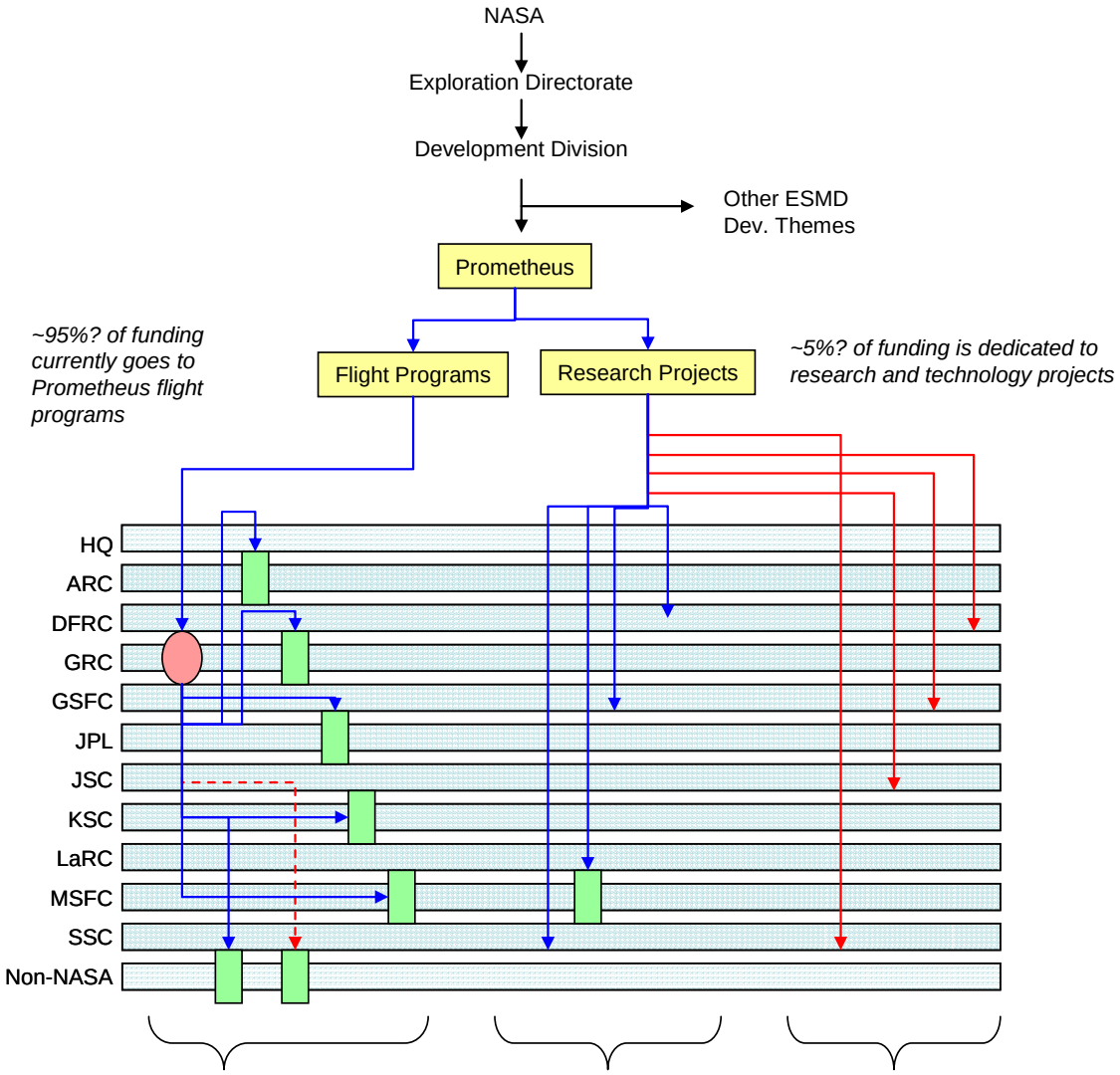
Approximately 25% of funding goes to the prime contractor.

The remaining 25% is split amongst several centers supplying support work to the project office.

There are several direct-funded research including an earmark to MSFC, systems studies at JPL and GRC, and roadmap activity at DOE.

Note that what is shown here is representational and not factual. Research projects are competitively distributed in open competition that can involve industry, NASA, other government organizations or any combinations of the these.

**Business Model for Exploration Directorate**
**Prometheus Nuclear Systems and Technology Theme**
**(FY06 – incomplete, as of 19 May 2005)**




Extraterrestrial Surface Power project office at GRC (?).

Approximately 50% of funding goes directly to the Department of Energy.

Approximately 25% of probably funding goes to the prime contractor (hypothetical currently).

The remaining 25% is split amongst several centers supplying support work to the project office.

It is not clear how much research work will be accomplished other than the earmark to MSFC.

It is likely that there will be little or no continuation of the competitively awarded research projects.

## Business Model for Exploration Directorate Constellation Systems Theme

Objectives and money allocation for the overall exploration area decided at agency level.

Exploration Directorate management located at HQ must finance the fulfillment of allocated agency level technology objectives.

Exploration Directorate decomposes agency level technology "Level 0" requirements and passes these requirements through the Development Division to the Constellation Systems Theme.

During FY05, Constellation Systems relies on the Systems Engineering and Integration Office (SEIO), working through its associated Integrated Discipline Teams (IDTs) to further decompose requirements. IDTs provide cross-cutting capabilities across many disciplines and across the agency. Starting in FY06, the structure for the support of the Constellation SEIO will be reconfigured into eight Integrated Product Teams (IPTs) managed out of five field centers plus discipline-oriented support in a format yet to be determined (as of early May 2005). Note that the plan to bring on a systems engineering and integration contractor have been, for now, scuttled.

During FY05, Constellation Systems nominally established program offices associated with different spiral requirements. Below these programs are project offices charged with delivering particular systems of hardware to become part of the overall system of systems that is Constellation.

For FY06 and beyond, it is unclear whether this nominal two-tier program/project structure within Constellation Systems based upon Spiral requirements will be maintained. Part of the reason for this is the fact that the "projects" in some cases are currently bounded in terms as large as "Launch Vehicles," which will likely itself consist of multiple "sub-projects."

For FY05, all project offices are located at HQ. One project office, that of the Crew Exploration Vehicle (CEV), is undertaking a procurement activity and is supported by its own IPT. Another project office, that for Launch Vehicles, is funding direct support from the field centers.

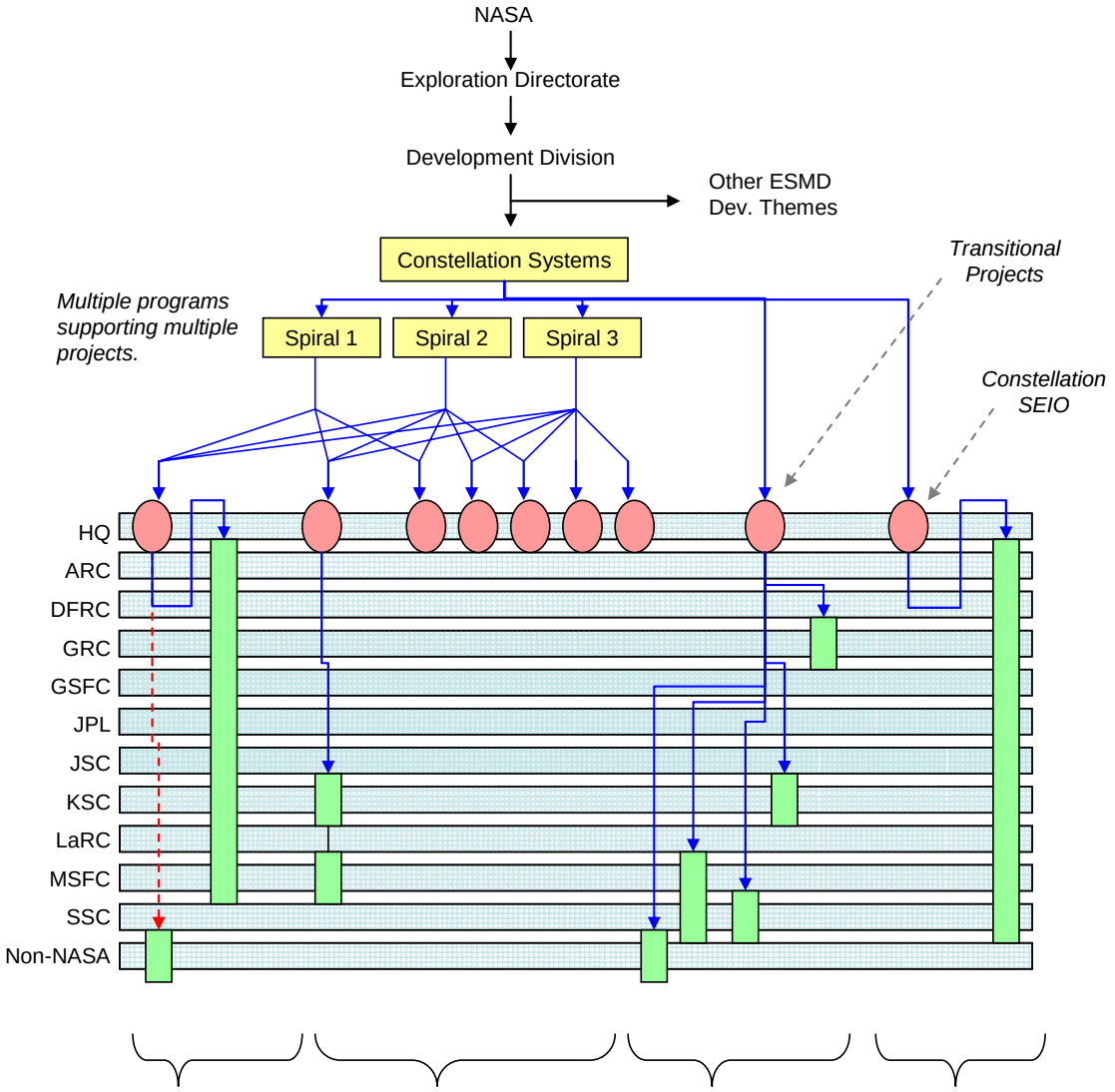
Eventually, perhaps beginning in FY06 though the timing has not yet been established, the many, maybe all, project offices will be moved field centers. Each project office, in addition to the various procurements from industry, will spawn one or more Integrated Product Teams (IPTs) to support the project office.

IPTs provide multi-discipline expertise dedicated to the creation of a final product and are nominally collaborative in nature and generally span across multiple centers. The SEIO IPTs are allocated funding through technical task agreements between HQ and the field centers.

While much of the civil service support for the various elements of Constellation appears currently to be slated as directed work, there still exist powerful undercurrents of inter-center competition. From the bottom up, people at the field centers consider the inclusion, leadership, and dominance of IPTs to be a subject of significant competition and consternation. This environment could act to suppress the potential technical and organizational benefits of collaboration. From the top down, there exists the distinct danger of "stove-piping," which translates to fundamental breakdowns in communication across the centers. Such a situation could make the integration of an undertaking as diverse and expansive as Constellation nearly impossible (historical precedent: Space Station Freedom). Thus, even in an environment nominally consisting of a great deal of directed work, the subjects of productive competition and collaboration remain paramount.

Note that at this point there is virtually no direct institutional infrastructure support. As the exploration effort matures, however, this may change.

## Business Model for Exploration Directorate Constellation Systems Theme (FY05)



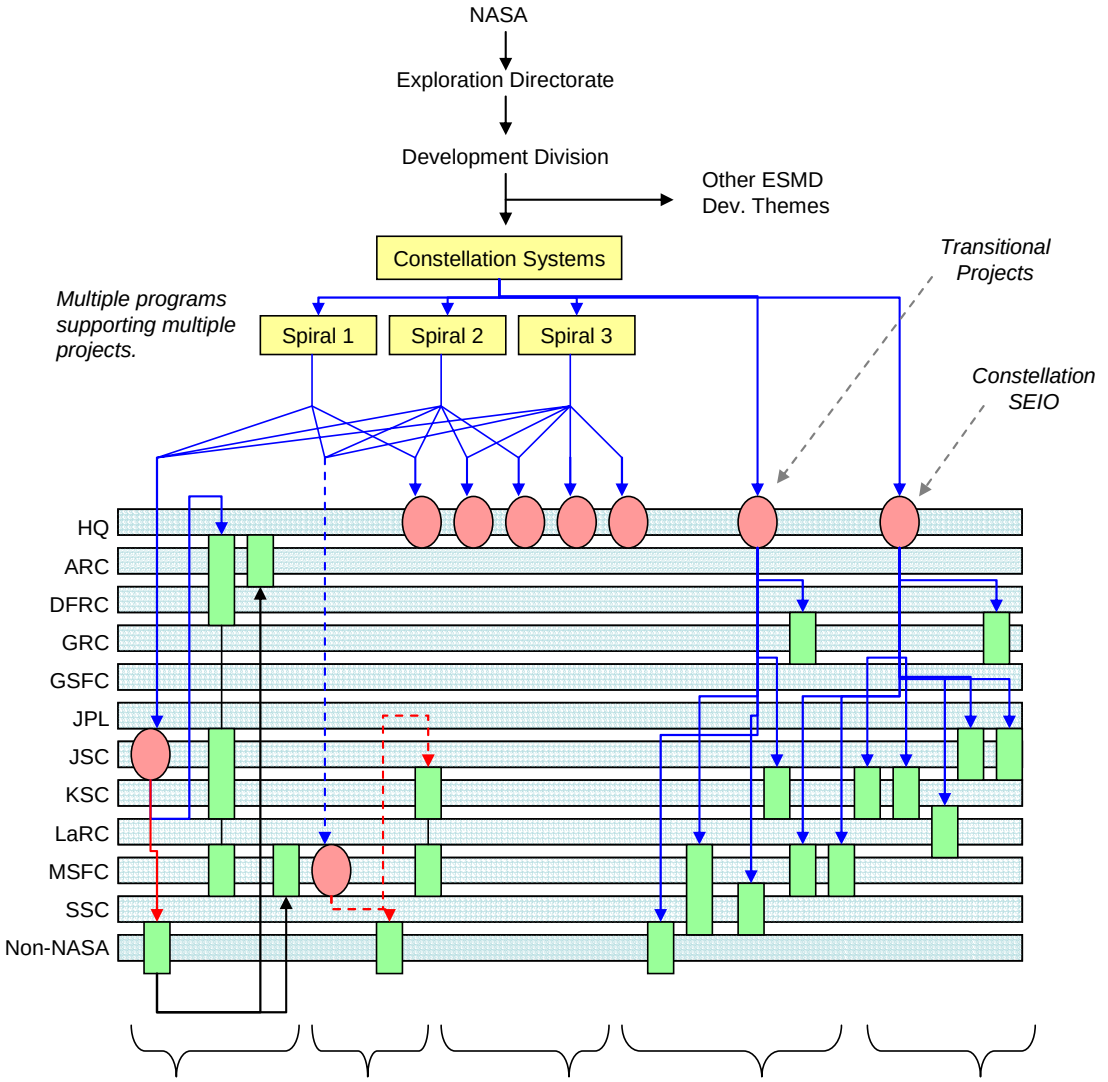

One project CEV undertaking a competitive procurement process. The project office is currently located at HQ, but once the contract is awarded, the project office will likely move to a center (JSC?). A multi-center team is supporting this activity.

Currently most of the project offices consist of little more than one or two people at HQ. One office, launch vehicles, is supported by directed funding to two centers.

Constellation is funding a number of transitional projects. These are largely remainders from pre-ESMD programs whose completion was considered to be a worthwhile investment.

For FY05, SEIO is supported by a matrix of 14 integrated discipline teams spread out across all of the centers.

## Business Model for Exploration Directorate
## Constellation Systems Theme (beyond FY05 – projection)




The CEV project office may (TBD) be moved from HQ to a center. The competitive procurement will be awarded and one or more IPTs will be established to support this project.

Probably the next project to expand and, possibly (TBD) move to a center will be the launch vehicle project. This will involve both procurements from industry and IPT support from the centers.

Into FY06, many of the projects will remain at HQ in the form of several people each. How, when, and if these projects are expanded or moved to field centers is currently TBD.

Constellation will continue to fund a number of transitional projects. How many previous projects will continue and how many new ones are started is currently unclear.

SEIO is supported by eight IPTs with leadership split over five field centers. Note that only the lead centers are shown here though the IPTs are each multi-center organizations.

# Aeronautics Research Mission Directorate Models (FY05)

General notes:

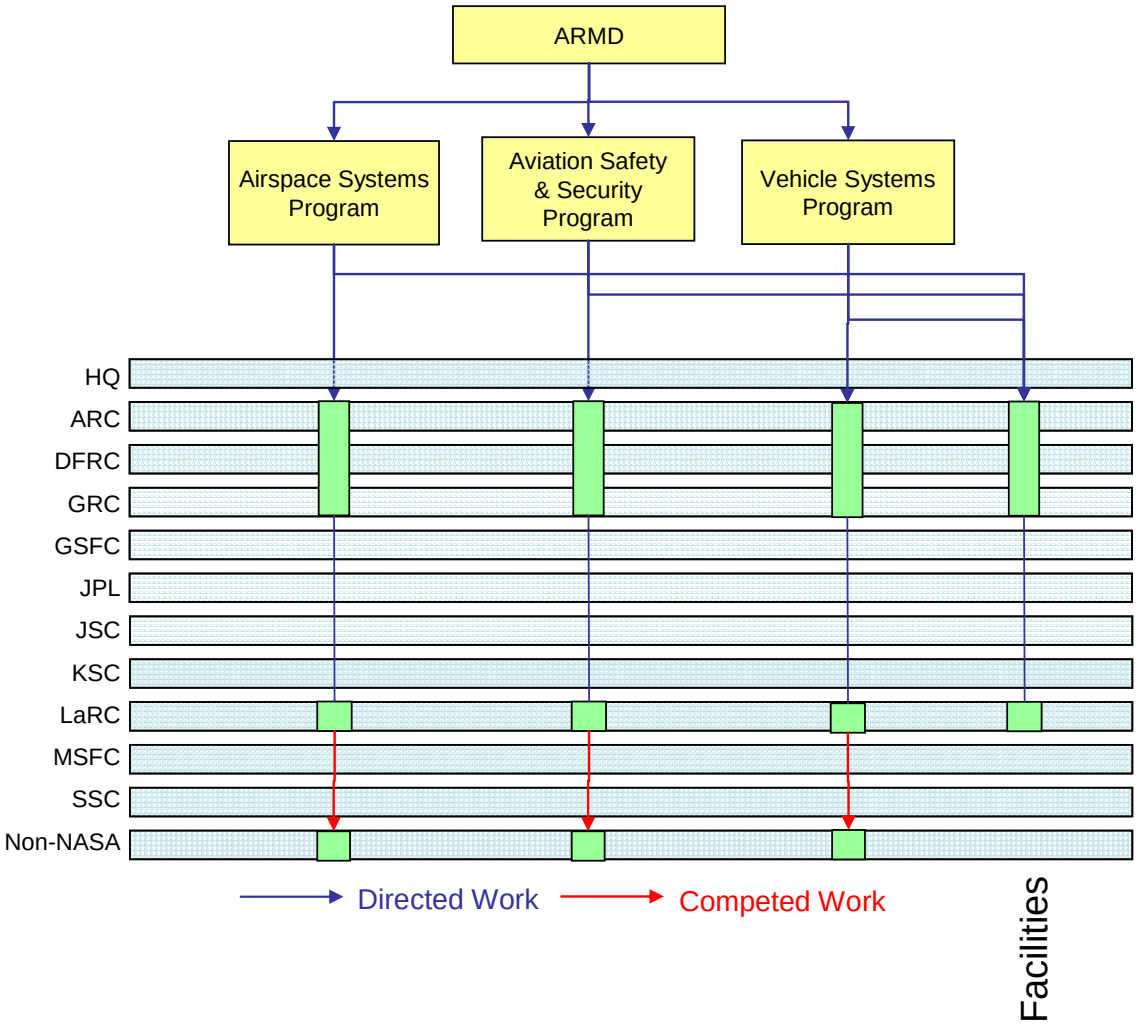
The ARMD is undergoing dramatic change. The following models show work allocation in FY05 in which 100% of the funds were directed from the Mission Directorate through the Programs to the Research Centers to the Projects. The Projects ran competitions for required support and foundational technology R&D.

Objectives and money allocation for the overall aeronautical area decided at agency level.

Aero Directorate management located at HQ financed both the fulfillment of the agency level technology objectives and the mandated, by law, institutional infrastructure. In FY05, all ARMD funding was directed to the three programs. Some of the funds in the programs were competed to support project objectives and foundational R&D. One program through which to accomplish technology objectives is the Vehicle Systems Program (VSP).

As an example, the Vehicle System Program business model is included. The VSP directed work to 7 different Project offices located at the three Research Centers for which ARMD acted as the Headquarters Center Executive (HCE). The project offices competed about 30-percent of their funds to support project objectives and foundational research. The VSP was also required to fund wind tunnel infrastructure; whether or not the wind tunnels supported VSP research objectives.

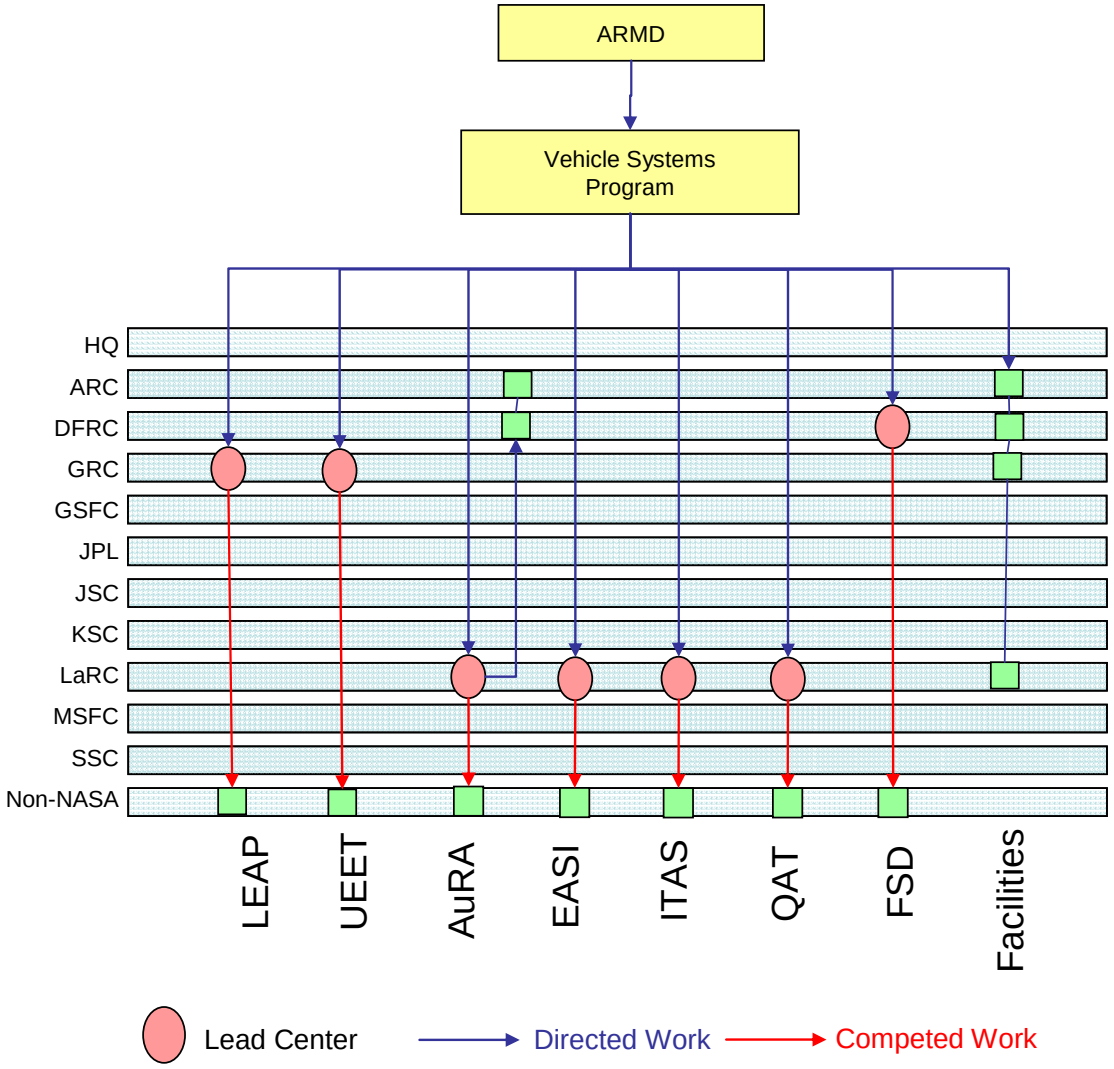
## Business Model for Aeronautics Directorate (FY05)




In FY05, the ARMD basically directed all funds to the 3 Programs in the Aeronautics Technology Theme. Within each program, funds were directed to various projects. The projects directed much of the work to the NASA civil service workforce but also conducted competitions to support project objectives and related foundational research. RFPs were typically used to procure services or hardware from non-NASA sources to support project objectives. Foundational research funding was competed internally at the lead center for each project and some funding was set aside for universities and industry via external competitions.

Some funds were set aside for mandatory support of facilities such as wind tunnels and WATR. These were all directed funds.

**Business Model for Aeronautics Directorate**
**Vehicle Systems Program (FY05)**




In FY05, the VSP basically directed all funds between 7 projects. The lead center for each project basically received the majority of the funds for that project. Within each project, funds were available for foundational research. Some of the foundational research funding was competed internally to the center and some was set aside for universities. Also, competitions were run for industry and university to support project objectives.

Some funds were set aside for mandatory support of facilities such as wind tunnels and WATR. These were all directed funds.

# Space Operations Mission Directorate Models

General notes:

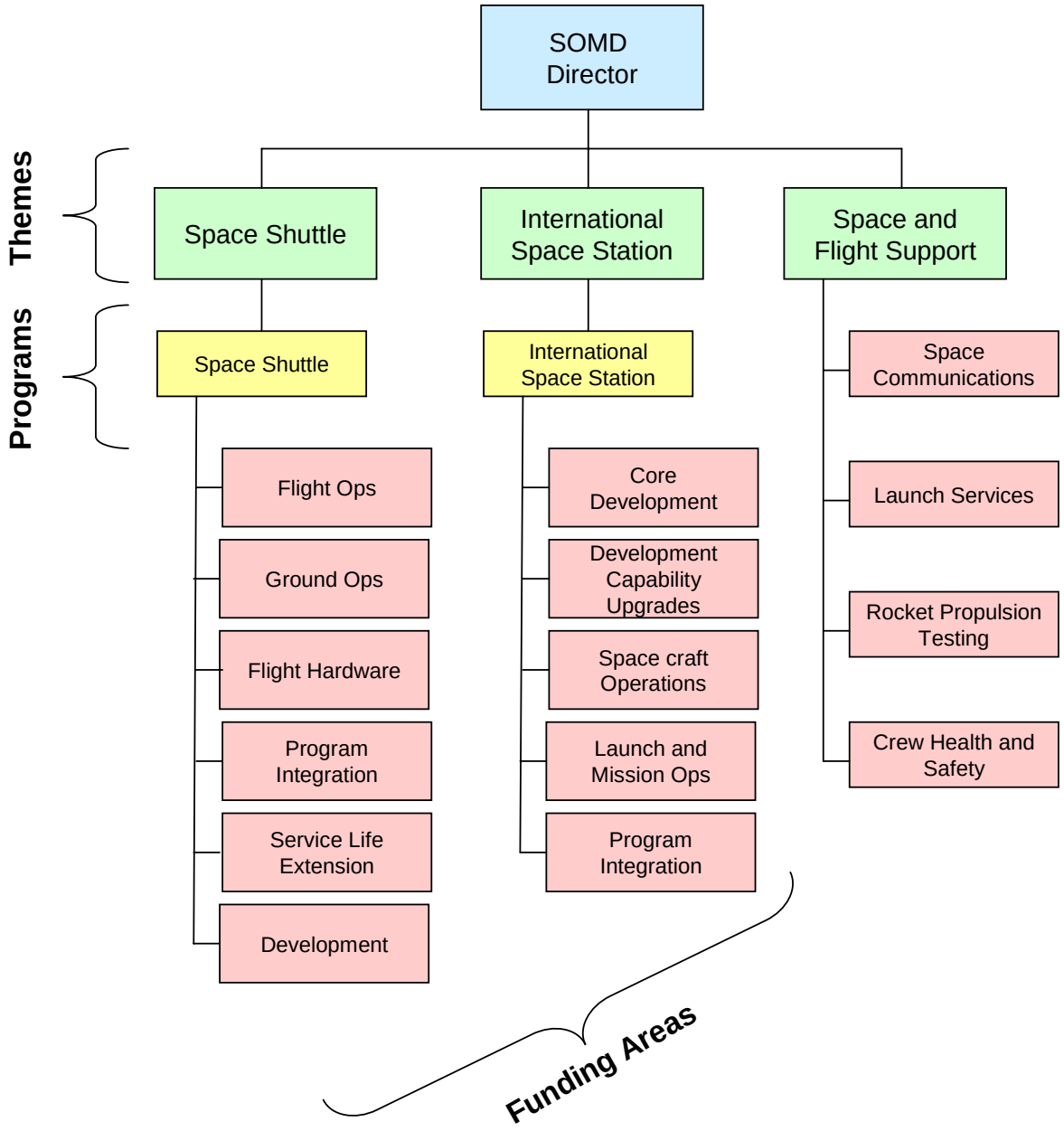
The Space Operations Missions Directorate (SOMD) gets its top-level requirements from the agency. Specifically, it is the job of SOMD to provide operations support to the space systems developed throughout the rest of the agency. This takes a three-prong form of the Space Transportation System (STS, i.e., Space Shuttle), the International Space Station (ISS), and then everything else, including non-crewed launch vehicles, space communications, and rocket systems testing.

Nearly all of the work throughout SOMD is considered to be directed. However, at the same time, a very large fraction is contracted out meaning that the work was competed at some point in the past but now, due to the long-term and specialized nature of the contracted work, effectively functions like directed work.

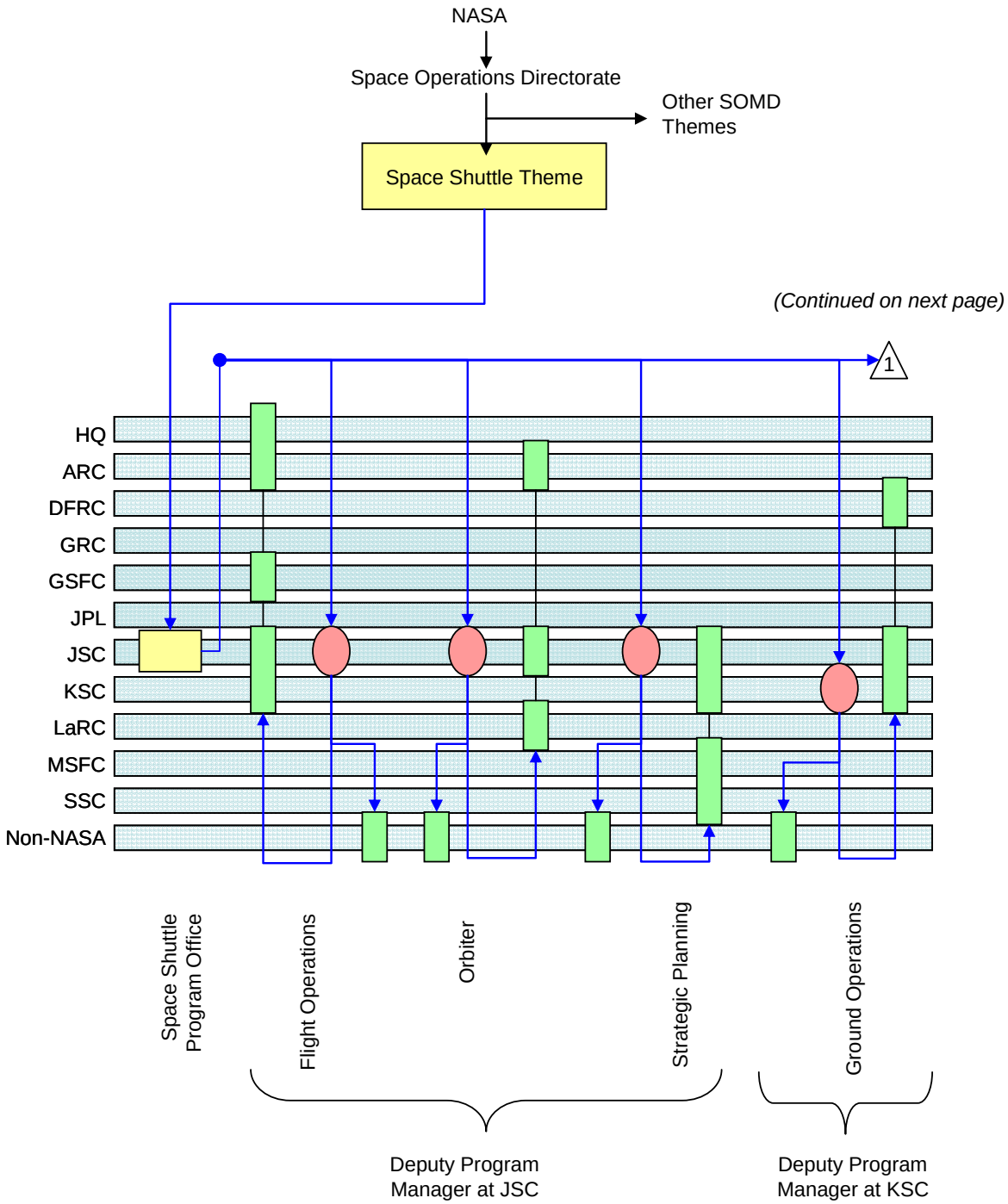
For NASA internal work, this too is nearly all directed through established program and project offices.

The large programs, STS and ISS, function through a two-tier, theme/program management arrangement. The actual program management resides at a center, both Johnson Space Center, but the executive-level, theme-level management is still maintained at Headquarters.

## Overall Space Operations Mission Directorate Organizational Overview



## Business Model for Space Operation Directorate
## Space Shuttle Theme



## Business Model for Space Operation Directorate
## Space Shuttle Theme (continued)

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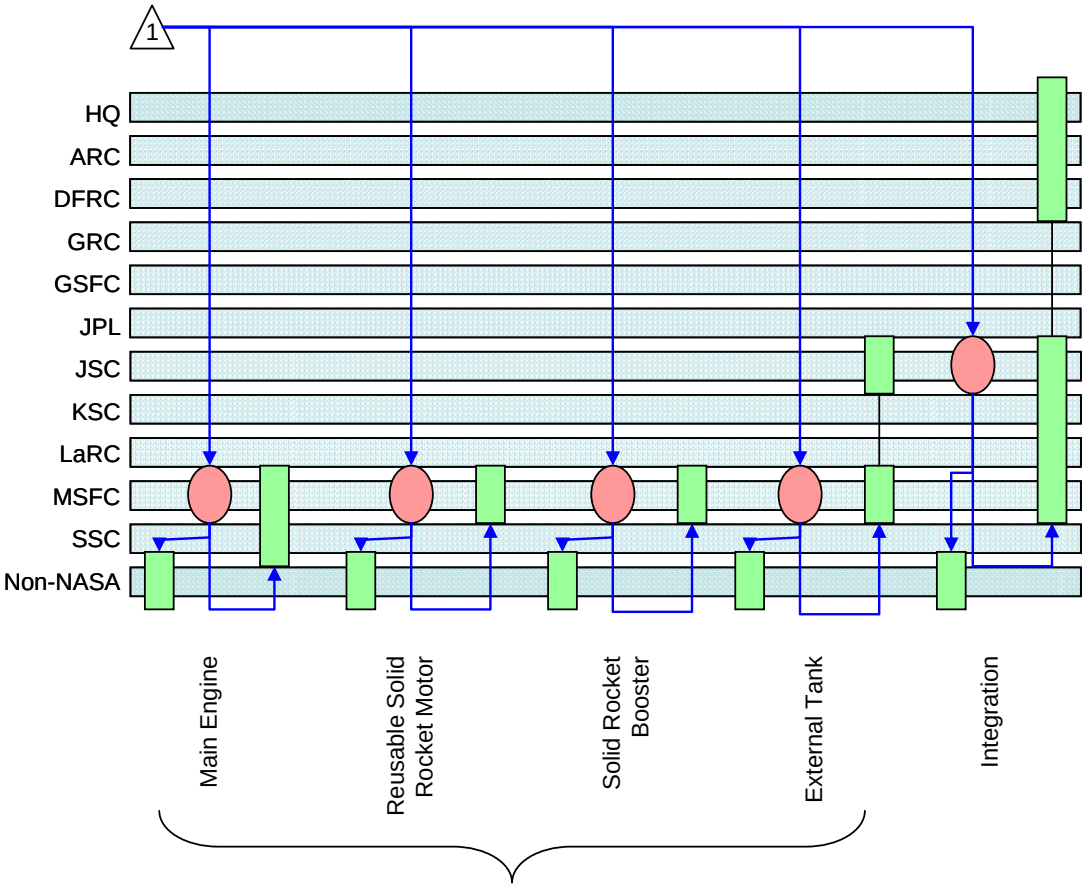
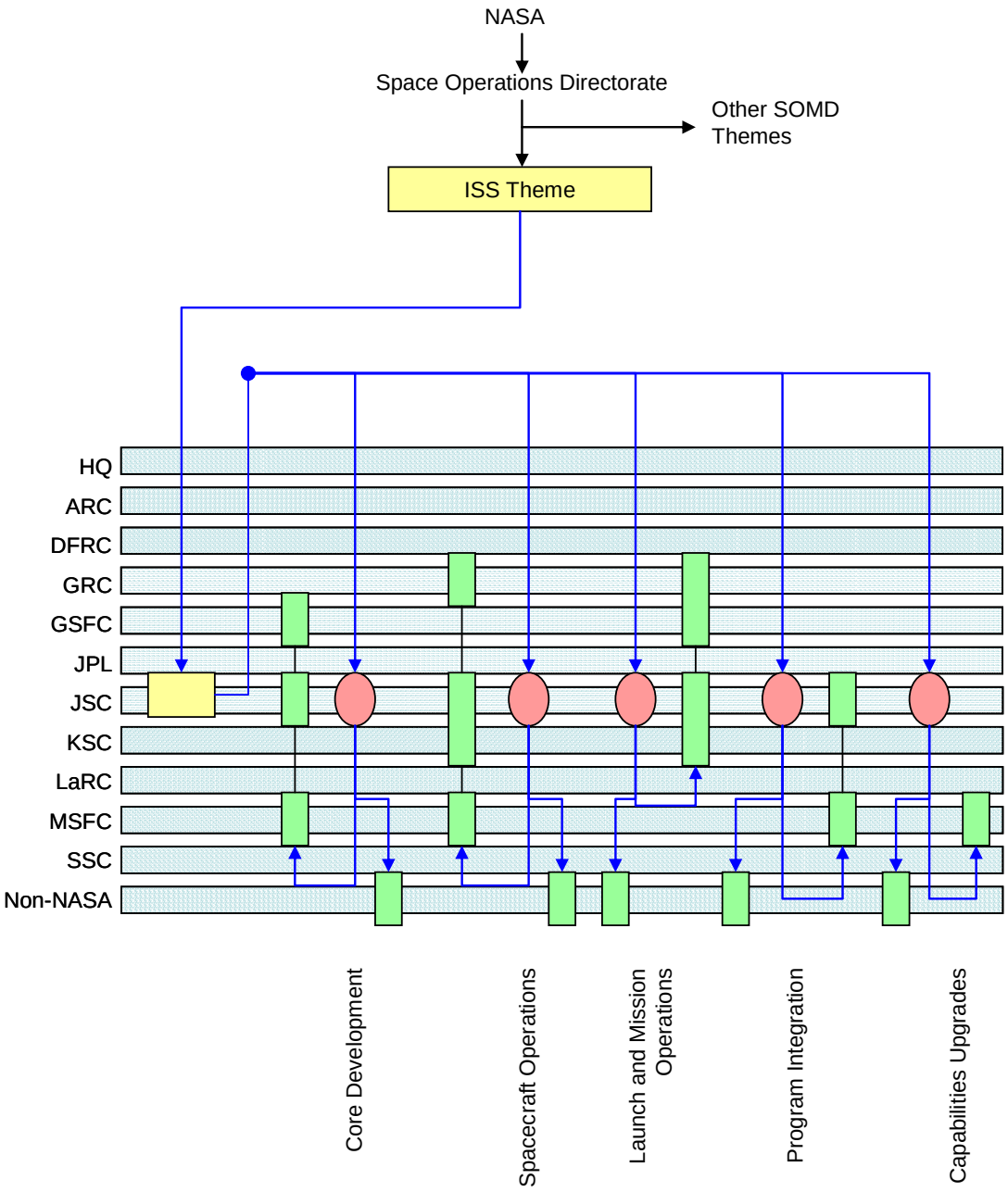
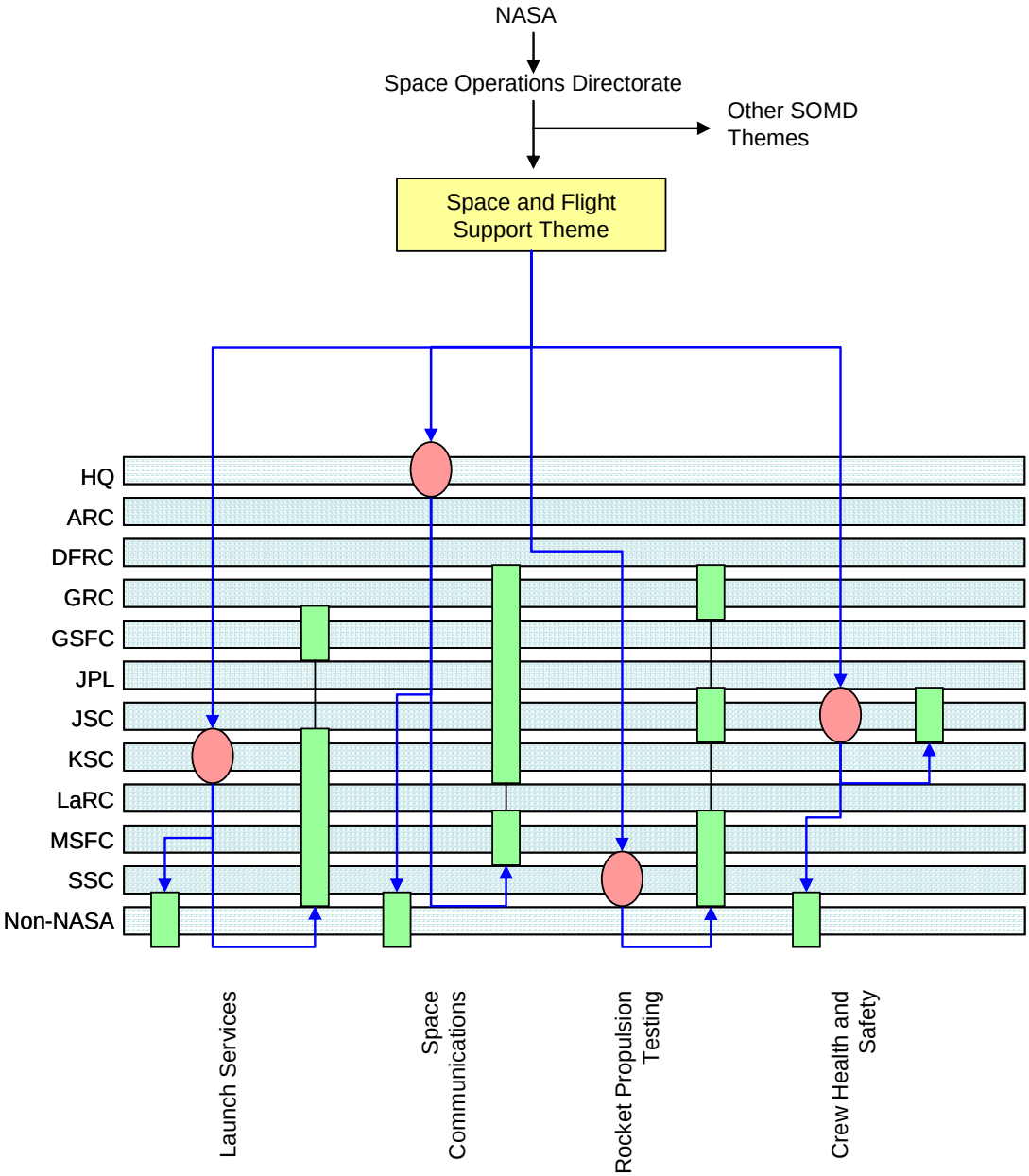



Space Shuttle Propulsion
(Deputy Program Manager at MSFC)

## Business Model for Space Operation Directorate
## International Space Station (ISS) Theme



## Business Model for Space Operation Directorate
## Space and Flight Support Theme



# Office of the Chief Information Officer (OCIO) Business Model

# DRAFT

# Office of the Chief Information Officer (OCIO) Business Model

Description:

OCIO currently uses a 99% directed approach for allocating work. For each new project, a lead Center CIO Office is selected as follows to manage the project:

- If the project requires specialized expertise in the area of a designated Principal Center, that Center will usually be selected to lead the project.
- If a project requires more general expertise, or no Center has been designated Principal Center or demonstrated dominant expertise in that area, then the lead Center is selected based on:
  - requirement to use an existing contract (e.g., ODIN);
  - availability of civil servant staff, an existing contract, and a competitive Center G&A rate;
  - balance of work distribution among Centers to maintain engagement in OCIO activities.

In about 90% of OCIO projects, all project funding is directed to the lead Center's CIO Office. Other Centers provide a modest amount of non-reimbursed support, as necessary, during project planning and implementation. In the remaining 10% of projects, some project funding is also directed to one or more supporting Centers. The OCIO's directed funding approach is effective because it maintains the focus of NASA CIO offices on addressing NASA IT issues, expeditiously initiates OCIO project planning and management, leverages known competencies and capabilities at NASA Centers, maintains collegial engagement of all Center CIO Offices, and keeps inherently governmental work within NASA.

The lead Center CIO office decides how to secure the necessary technical expertise to complete the project, drawing from Center CIO staff, other civil servants, and contracts. If contractor support is needed, the following approaches may be used:

- Use an existing contract when other NASA customers use that contract for this service.
- For relatively small projects (~75% are < $1M/year), add tasks to an existing contract.
- For relatively large contracts, consider competition within industry.

In rare cases where HQ is selected as the lead Center, the OCIO uses the above decision process to secure contractor support. As a result, about 1% of OCIO project funding is competed externally.

While the OCIO currently uses the above all-directed funding approach, OCIO sees substantial value in leveraging competition to:

- gather a broad set of creative ideas to most effectively and efficiently accomplish project goals,
- assure that NASA gets the best value in management and implementation of OCIO projects, and
- encourage NASA's CIO workforce to maintain and sharpen their skills.

To realize these benefits and align OCIO with NASA's Competition Principles, **in the future**, the OCIO will add the following work allocation rules to its current work allocation appraoch:

- Principal Center projects: Validate designations every 3 years
- Non-Principal Center projects: Conduct simple inter-Center competition to select Project Lead Center or multi-Center team
  - Tailor rigor of competition to scale of project, so that benefits exceed cost
  - Limit competition cost to 5% of expected project cost
  - Limit competition time to 10% of expected project duration
  - Validate Lead Center selection every 3 years
- Large projects: Encourage Lead Center to use competition for contractor support

## *Current FY05* Business Model for NASA HQ Office of the Chief Information Officer (OCIO)

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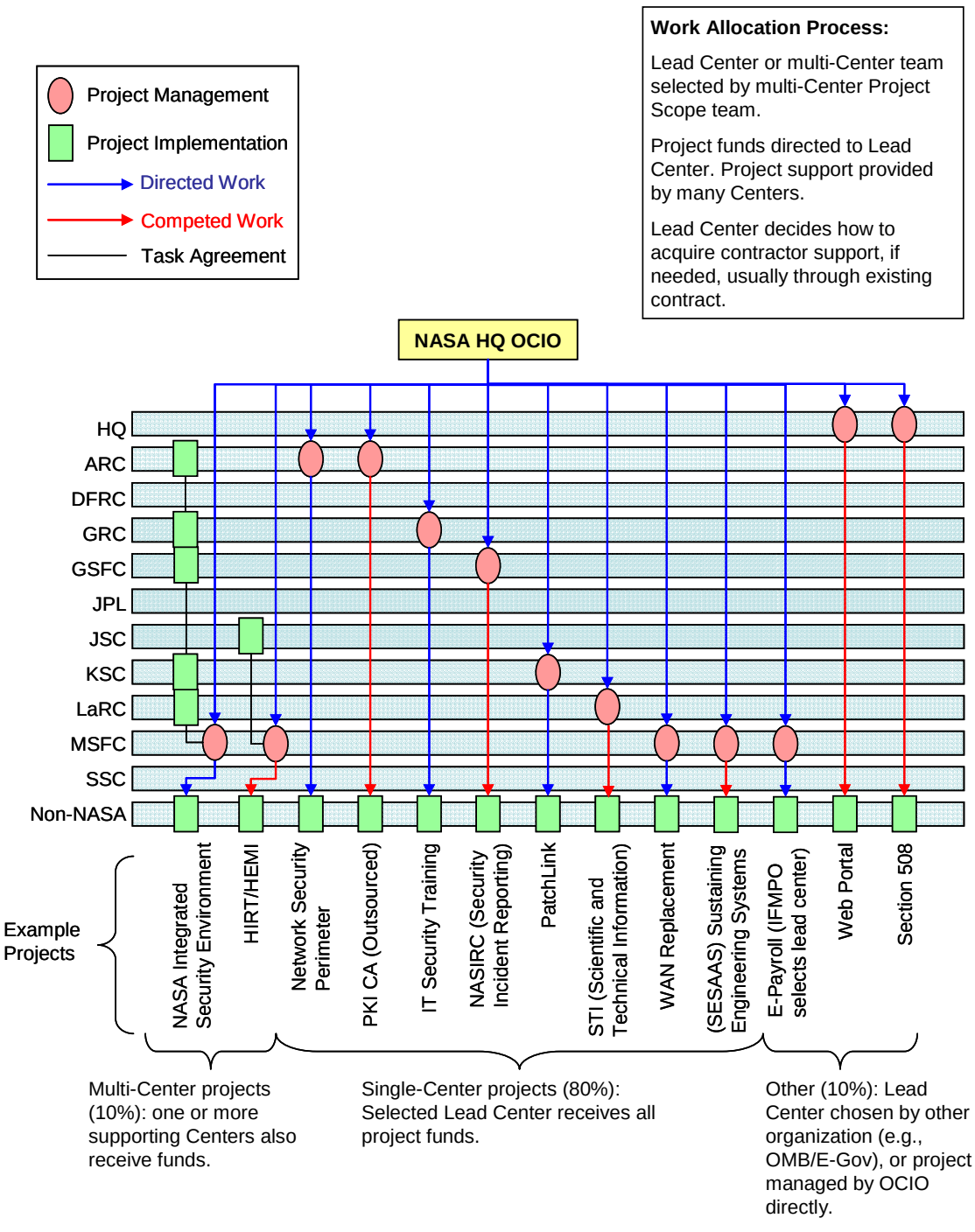

## *Planned Future* Business Model for NASA HQ Office of the Chief Information Officer (OCIO)

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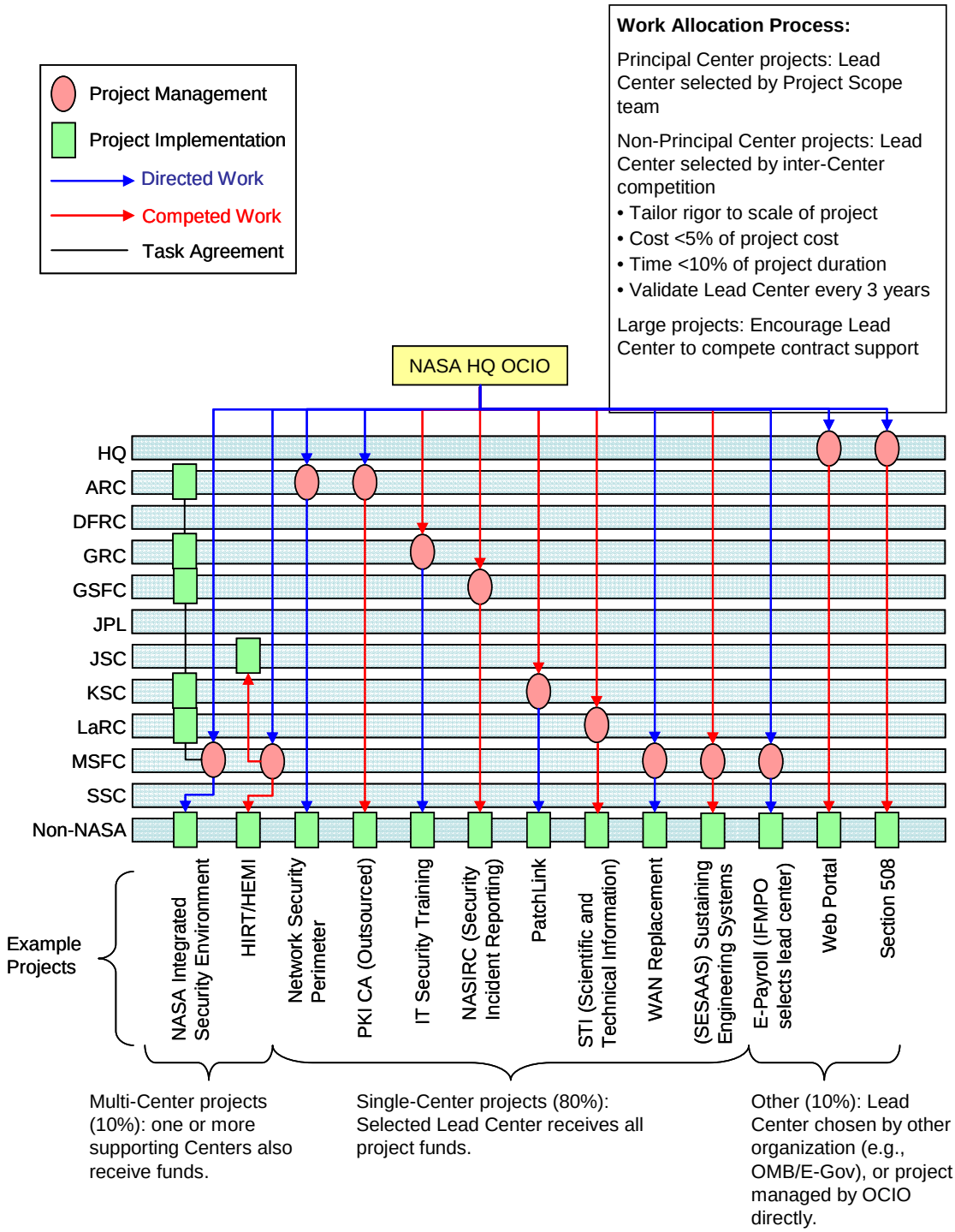


## OneNASA CWG Materials

The following section contains the various materials assembled by as part of the LDP 2004-05 Class Project in order to coordinate with the OneNASA Competition Working Group.

## CWG Action #2 – Instructions for Responding Organizations

These instructions lead organizations through the process of gathering and analyzing the information necessary to respond to Action #2 of the Competition Working Group (CWG).

CWG Action #2: Implementation of NASA's Competition Principles and Policy. All NASA organizations that have accountability for budget distribution and/or work assignment shall evaluate their use of competition and directed work against the Adopted Competition Principles and Policy (attached) and publish their business rules for implementation and operation.

CWG Action #2 addresses the following issues:

- Competition between NASA organizations for NASA budget
- The ability of NASA organizations to compete fairly and openly
- The impact of competition and directed work on collaboration and information sharing

CWG Action #2 includes the following work allocation approaches:

- Work directed to or competed between NASA organizations
- Any competition that does or could allow NASA participation, including competitions that require a non-NASA principal investigator but allow partnering with NASA

CWG Action #2 does ***not*** include the following organizational expenses:

- Earmarks, since NASA policies can not substantially affect earmark disposition
- Organizational management & operations costs, since these do not impact the issues listed above

Steps for each Accountable Organization to complete CWG Action #2:

1. Determine the dollar magnitude of the current (FY05) budget allocated to various categories of competed and directed work that is managed by the Organization.
2. Analyze current (FY05) rules and practices that govern competition and directed work transactions in the Organization and compare to the Adopted Principles and Policy. Develop a plan to revise the Organization's business rules and practices as appropriate to implement the Adopted Principles and Policy.
3. Publish to the NASA workforce the business rules and processes that will guide future operations of the Organization.

Accountability: Mission Directors, AA/Institutions and Management, Offices managing Corporate G&A, Education

Instructions for gathering and analyzing the information needed to complete CWG Action #2:

1. Optional: Complete one "WAA" Form for each distinct work allocation approach used or planned by the Organization. Use of this form may help the Organization to understand and explain their overall work allocation rules for Step 2 below.
2. Complete the "WA Rules" Form analyzing the Organization's overall work allocation rules. This is the information needed for the Organization's response to CWG Action #2.

**NASA Principles and Policy for Competition and Directed Work**

(To be added to the NASA Strategic Management Handbook, Section 3.3.3.3, when final)

It is NASA's policy to assure that competition and directed work transactions performed inside NASA are conducted in a fair and open manner and performed in such a way as to facilitate and encourage information sharing and collaboration. All NASA organizations that participate in the internal budget distribution and work assignment processes shall implement and follow the following principles:

Use of Competition – When to Compete:

- In discovery based science and technology development, freely compete ideas inside and outside the government.
- To create new capability or to place new programs and projects where no demonstrated in-house capability currently exists, compete for ideas across NASA
- Use competition to augment, sharpen and validate NASA's in-house core competencies and capabilities

Use of Competition – When not to Compete:

- Minimize competition among NASA organizations where "best in class" core competencies or capabilities have been demonstrated and recognized.
- When the cost of competition exceeds the potential benefits and isn't in the strategic interests of the Agency.

Use of Directed Work

- Use Directed work as needed to leverage and sustain unique, Mission relevant competencies and capabilities that may not be fully supported by competitively won work.
    - Strategically use directed work assignments where in-house, Mission relevant "best in class" competencies and capabilities have been demonstrated

Validation of results from directed work assignments

- Validate and demonstrate through periodic peer review that the work and competencies resulting from directed work are of high quality and considered "best in class."

Strive for collaboration, information sharing and fairness in all competition and directed work transactions

- All formal and informal competitions and directed work decisions should encourage and reward appropriate collaboration between centers and organizations.
- Assure an unbiased selection process in all work placement transactions including relevant selection criteria to assure best value, peer/expert review panels and assurance that reviewers and selection officials are not benefiting from results.
- Maintain openness and full communication regarding rules, processes, decisions and outcomes pertaining to all formal and informal competition and directed work transactions.

**CWG Action #2 – WA Rules Form**
**Organization Work Allocation Rules (WA Rules) Baseline, Alignment, and Plans**

Instructions: After optionally completing one WAA Form for each current and planned work allocation approach (WAA) used by the Organization, complete this summary of the overall work allocation rules (WA Rules) for the Organization.

**Responding Organization:**
**Organization Point of Contact:**
**Leadership Development Program (LDP) Assistant:**
**Date Modified:**

**1. Baseline (FY05) Funding Allocation.** Indicate the dollar magnitude of Organization budget allocated in FY05 (baseline year) to each competition or directed category below.

**C - Competed: $**
**CB - Broad: $**
**CE - External: $**
**CEE - External only: $**
**CEI - NASA allowed: $**
**CI - Internal: $**
**CII - Internal only: $**
**CIE - External allowed: $**
**D - Directed: $**

**2. Baseline WA Rules.** Describe the Organization's current (FY05/baseline) WA Rules and philosophy. How does the Organization currently decide which of the above work allocation categories to use for a given work allocation? Also summarize the current primary work allocation approaches.

**3. WA Rules Alignment and Plans.** Summarize the alignment, misalignment, and plans for alignment of the Organization's WA Rules with each Principle summarized below. [Full text of Principles is in the CWG Action #2 Instructions.]

**Principle 1.** When to Compete:
- Broad competition: Discovery based science and technology development
- Internal competition: Create new capability or place new programs/projects
- All competition: Sharpen NASA's core competencies and capabilities

**3-1a.** How are current WA Rules *aligned* with this Principle?

**3-1b.** How are current WA Rules *mis-aligned* with this Principle?

**3-1c.** If current WA Rules and this Principle are not fully aligned, describe *plans* for achieving alignment.

**Principle 2.** When not to Compete:

- Recognized "best in class" core competencies or capabilities
- Cost of competition exceeds potential benefits

**3-2a.** How are current WA Rules *aligned* with this Principle?

**3-2b.** How are current WA Rules *mis-aligned* with this Principle?

**3-2c.** If current WA Rules and this Principle are not fully aligned, describe *plans* for achieving alignment.

**Principle 3.** When to use Directed Work:

- As needed to leverage and sustain core competencies and capabilities not fully supported by competition

**3-3a.** How are current WA Rules *aligned* with this Principle?

**3-3b.** How are current WA Rules *mis-aligned* with this Principle?

**3-3c.** If current WA Rules and this Principle are not fully aligned, describe *plans* for achieving alignment.

**Principle 4.** Validate through peer review that directed work is "best in class."

**3-4a.** How are current WA Rules *aligned* with this Principle?

**3-4b.** How are current WA Rules *mis-aligned* with this Principle?

**2-4c.** If current WA Rules and this Principle are not fully aligned, describe *plans* for achieving alignment.

**Principle 5.** Strive for collaboration, information sharing and fairness in all work transactions:

- Reward appropriate collaborations across NASA
- Assure unbiased selection process
- Maintain openness regarding rules, processes, and decisions

**3-5a.** How are current WA Rules *aligned* with this Principle?

**3-5b.** How are current WA Rules *mis-aligned* with this Principle?

**3-5c.** If current WA Rules and this Principle are not fully aligned, describe *plans* for achieving alignment.

**CWG Action #2 – WAA Form**
**Work Allocation Approach (WAA) Baseline, Analysis, and Plans**

Instructions: Complete one copy of this form for *each* work allocation approach (WAA) used or planned by the Organization. Use of this WAA form is optional for CWG Action #2, but it may help the Organization to understand and explain their overall work allocation rules for completion of the required "WA Rules" Form.

**Responding Organization:**
**Organization Point of Contact:**
**Leadership Development Program (LDP) Assistant:**
**Date Modified:**

**1. WAA Identification**. Identify the WAA analyzed in this form. [Note that the initiating competition or directed funding decision for this WAA may have occurred in a previous year.]

**1a.** Name of WAA: [e.g., BAA, Intramural RFP]
**1b.** Specific WAA vehicles included: [e.g., BAA #s; all directed funds]
**1c.** Total FY05 (baseline) funding for this WAA: [FY05 $]
**1d.** Is this a *current* (FY05/baseline) or *planned* WAA: [current/planned]
**1e.** Year this WAA was last competed (if applicable): [year]

**2. WAA Classification.** Classify this WAA by checking one box at each level of the following classification hierarchy, as appropriate.

☐ **C - Competed**: Work allocated using the following process: opportunity announcement or proposal invitation, proposal submittal, formal proposal evaluation, and winner selection. [Note: For this action, work allocated by competition in a previous year is still classified as competed in FY05.]
- ☐ **CB - Broad**: Both NASA and outside organizations are eligible to compete for work/funds.
- ☐ **CE - External**: Only outside organizations are eligible to compete for work/funds.
  - ☐ **CEE - External only**: External offeror not permitted to allocate work/funds to NASA.
  - ☐ **CEI - NASA allowed**: External offeror permitted to allocate some work/funds to NASA partners.
- ☐ **CI - Internal**: Only NASA organizations are eligible to compete for work/funds.
  - ☐ **CII - Internal only**: NASA offeror not permitted to allocate work/funds outside of NASA.
  - ☐ **CIE - External allowed**: NASA offeror permitted to allocate some work/funds to external partners.

☐ **D - Directed**: Placement of programs, projects, or investments at a NASA organization (for management and implementation) without competition (as described above) for that placement. [Note: For this action, informal down-selection of investment ideas or organizations in reaching a directed decision is classified as directed work allocation.]

**3. WAA Description.** Briefly describe this WAA. For example: What are the steps of the work allocation process? What is the method of work agreement? How is performance tracked and reviewed? What is the duration of work? Does the work include a management function? Does the work include technical implementation?

**4. WAA Rationale (optional).** List the primary reason(s) that this WAA is currently used.

**5. WAA Strengths and Weaknesses (optional).** Describe any notable best practices, strengths, or weaknesses of this WAA in its current form. These may relate to:

- Alignment with NASA Core Competency policy, including whether and how WAA supports the Agency Core Competencies and other key Organizational competencies
- Time/effort/cost to initiate work (e.g., develop RFP, prepare and evaluate proposals, initiate funding)
- Efficiency (cost, productivity), quality (technical performance), and innovation (likelihood of substantially new/better technologies or processes) of work performed
- Quality/value of collaborations involved
- Benefits or detriments to inter-Center relationships and One NASA
- Technical and Management Risk
- Management/administration/oversight effort/cost
- Affect on workforce morale, development, and turnover
- Public and political (Administration, Congressional) support
- Support for NASA Vision, NASA strategy, education/outreach

**6. WAA Alignment and Plans.** Describe the alignment, misalignment, and plans for alignment of this WAA with each Principle summarized below. [Full text of Principles is in the CWG Action #2 Instructions.]

**Principle 1.** When to Compete:

- Broad competition: Discovery based science and technology development
- Internal competition: Create new capability or place new programs/projects
- All competition: Sharpen NASA's core competencies and capabilities

**6-1a.** How is this WAA *aligned* with this Principle?

**6-1b.** How is this WAA *mis-aligned* with this Principle?

**6-1c.** If the WAA and Principle are not fully aligned, describe *plans for achieving alignment*.

**Principle 2.** When not to Compete:

- Recognized "best in class" core competencies or capabilities
- Cost of competition exceeds potential benefits

**6-2a.** How is this WAA *aligned* with this Principle?

**6-2b.** How is this WAA *mis-aligned* with this Principle?

**6-2c.** If the WAA and Principle are not fully aligned, describe *plans for achieving alignment*.

**Principle 3.** When to use Directed Work:

- As needed to leverage and sustain core competencies and capabilities not fully supported by competition

**6-3a.** How is this WAA *aligned* with this Principle?

**6-3b.** How is this WAA *mis-aligned* with this Principle?

**6-3c.** If the WAA and Principle are not fully aligned, describe *plans for achieving alignment*.

**Principle 4.** Validate through peer review that directed work is "best in class."

**6-4a.** How is this WAA *aligned* with this Principle?

**6-4b.** How is this WAA *mis-aligned* with this Principle?

**6-4c.** If the WAA and Principle are not fully aligned, describe *plans for achieving alignment*.

**Principle 5.** Strive for collaboration, information sharing and fairness in all work transactions:

- Reward appropriate collaborations across NASA
- Assure unbiased selection process
- Maintain openness regarding rules, processes, and decisions

**6-5a.** How is this WAA *aligned* with this Principle?

**6-5b.** How is this WAA *mis-aligned* with this Principle?

**6-5c.** If the WAA and Principle are not fully aligned, describe *plans for achieving alignment*.

# Appendix B: Business Case

## Business Case Activities

### Executive Summary

The Business Case Team of the NASA Leadership Development Program (LDP) 2004-05 Class Project initially intended to perform business case analyses on the various work and funding allocation business models used by the NASA Mission Directorates. However, the research-oriented nature of the LDP project resulted in the evolution of the project scope and direction, re-focusing the goal of the Business Case Team towards the development business decision tools. The goal was to develop tools to assist mission directorates and program and project managers in deciding between competed or directed work and funding allocation approaches. The results of the work by this task team included the following tools: a Strengths, Weaknesses, Opportunities, and Threats assessment guide; a list of Key Business Questions; and a Reward-Risk Tool for making these business decisions. These tools are designed to help managers understand the environments associated with competed and directed work choices and to assist in identifying the risks and rewards associated with each allocation approach. The tools are intended to be customized to a specific user's situation and need.

### Introduction

The Business Case task undertaken at the beginning of the LDP 2004-05 Class Project directly supported the project's Goal #1: to develop business models and supporting business cases that optimize NASA's Mission Directorate (MD) use of competition and collaboration. Specifically, the business case project requirement was defined in project objective 1.3, to develop a business case that provides a detailed return on investment (RIO) analysis process for developing MD competition/collaboration business models.

It was originally envisioned that the Business Models Team would first develop business models documenting how NASA MDs currently conduct business. The goal was to generate models of sufficient detail and breadth to support the development of hypothetical optimized competition and collaboration business models applicable to future NASA programs. During initial conversations with the LDP 2004-05 Class Project sponsors, it was suggested that a business case analysis be performed to better understand why it makes sense to follow a competed versus directed work approach (or vice versa), and to understand the benefits of collaboration within each. The Business Case Team took on this effort, originally planning to provide some verification of the effectiveness of the optimized model(s) by using a traditional business case analysis approach. Thus the desired result of this task was to provide compelling justification for implementing optimal utilization of both competition and collaboration.

In most research projects, the objectives and tasks can and do evolve and change as the team members learn more about the subject at hand. This overall project and the Business Case task were no exceptions. As the project progressed, the Business Models Team developed several graphical and textual descriptions of current MD work allocation approaches. However, the time and effort involved in documenting the complexity and broad

diversity of current MD work allocation methods did not allow for development of new, optimized business models.

Additionally, the OneNASA Competition Working Group (CWG) developed a set of principles for healthy competition that were adopted by NASA. These CWG Competition Principles provided guidance regarding when to apply competed and directed work allocation methods to best achieve mission success. The CWG Competition Principles thus began to establish the basis for making a decision on a competed versus directed work approach. Since this was, in large part, the goal of the LDP 2004-05 Class Project business case analysis, the direction of the Business Case task was re-evaluated.

Although the CWG Competition Principles provided initial guidance for the MDs, it was clear from the LDP 2004-05 Class Project collaboration with the CWG and the MD points of contact (See Appendix A) that the MDs could benefit from additional information and analysis regarding how to perform the model development. Additionally, agency redirection concerning competition and directed work in the transition from Administrator O'Keefe to Administrator Griffin further indicated a need for improved, tailor-able tools to assist in business decision making. It was further recognized that a process for communicating how these types of decisions are made back to the workforce is needed. Thus, the overall LDP 2004-05 Class Project and the Business Case Team focus changed from the development of a roadmap to the creation of tools for effective collaboration, competition, and directed work within NASA.

A significant event in the evolution of the Business Case task occurred late in the LDP project year, when the Business Models Team neared completion of their Mission Directorate and other selected business models. With the Business Models Team workload decreasing and the Business Case Team workload increasing, the two teams combined to form the Business Team and take advantage of the synergies in bringing the collective groups together.

The Business Team theorized that program and project managers would probably need to do both some directed work and some competed work in order to optimize the potential strength of each. The difficulty lies in knowing when to apply each type to achieve best value for a given project, program, or directorate. Realizing that this is the challenge that needed to be addressed, the Business Team settled on the following final goal:

> Develop tools to a) assist project, program, and mission directorate management in deciding when to apply competed and directed work allocation approaches and, b) assist in enhancing the use of competition, directed work, and collaboration

An additional desired benefit of such tools is that they will facilitate ability of management to communicate to the workforce the process and rationale used in making work and funding allocation decisions.

**Approach**

The Business Team developed its approach through the classic research project method – through trial balloons, animated discussion and careful evaluation, and the eventual casting-off of approaches that were less valuable in achieving goals. Initially the team performed research on the contents of a traditional business case assessment. Learning that traditional business case assessments focused on financial return on investment (ROI), an area not

straightforwardly applicable to NASA, the team immediately began tailoring the task to address the NASA environment and the objectives of the LDP 2004-50 Class Project.

As the project evolved, it became apparent that the Strengths, Weaknesses, Opportunities, and Threats, (SWOT) analysis component of the traditional business case could be a valuable tool for NASA managers. The SWOT analysis is a method of capturing the environmental factors affecting an organization and is an important early step in any organization's strategic planning process. Within the SWOT, environmental factors that are internal to the organization are grouped as strengths or weaknesses, while external factors are grouped as threats or opportunities. The Business Team chose to develop a SWOT tool that would assist managers in understanding the operating environments associated with both competed and directed work. Political aspects were also included in the Business Task SWOT tool. [References: http://www.quickmba.com/strategy/swot, http://www.businessballs.com/swotanalysisfreetemplate.htm]

Since the SWOT assessment typically is only the first step in the strategic planning process, the Business Team realized that additional tools were needed to assist Agency managers in developing business strategies. In developing the SWOT tool, the team recognized that a related set of Key Business Questions could be developed that would lead a project/program/directorate manager through the strategic thought process of deciding on competed or directed work allocation approaches, and in considering the benefits and significance of collaboration.

Additionally, team members felt that a more quantitative tool would also be beneficial. Expanding on a traditional NASA risk assessment approach, the team used the SWOT tool elements and the derived Key Business Questions to populate a Reward-Risk Tool for decision making. This approach assumes that the strengths and opportunities within the SWOT assessment could potentially lead to project/program rewards, while the weaknesses and threats potentially lead to the project/program risks. The Reward-Risk Tool is designed to assist management in assigning scores for competed and directed work for a given project, program, or directorate. This quantifying Reward-Risk Tool illuminates the selection process and highlights methods to enhance the implementation of the selected work allocation approach.

The final step of the Business Team approach involved testing and validating the business tools using a case study. The case study chosen was a hypothetical new rocket engine development project scenario. The case study rocket engine development project was used to populate the Reward-Risk Tool, taking into account the SWOT and Key Business Questions associated with the engine scenario. This test case helped the team to gain confidence in the use of the Reward-Risk Tool for decision making.

**Results**

The Business Task products are shown in the following Products section of this appendix. The SWOT assessments for both competed and directed work environments are shown first. They are presented in the traditional SWOT matrix format that is common in most business case assessments; however, for ease of interpretation the strengths and weaknesses (Ss and Ws) are separated from the opportunities and threats (Os and Ts) here. The matrices also include identification numbers associated with the SWOT entries. Directed work strengths, weaknesses, opportunities, and threats are designated as DS, DW. DO, and DT respectively. The competed work SWOT entry numbers follow the same approach. The SWOT assessments are generic in nature and are intended to be viewed as staring points or models

to follow when deciding on the appropriate work allocation approach. The entries in the SWOT were developed by considering mission or project/program success, as well as factors such as organizational excellence, workforce excellence, political concerns, and alignment to strategies and policies.

Following the SWOT tables are Key Business Questions that NASA program/project managers can use as guidance in developing business and work allocation strategies. The questions were derived as part of the SWOT development process. When defining each SWOT entry, it was realized that corresponding detailed questions could help Agency managers decide whether or not a particular condition was a strength, weakness, opportunity, or threat for a given project or program. Thus, the questions shown correspond to various entries in the SWOT matrices, as indicated by the SWOT identification number accompanying each question.

Following the list of questions are snapshots of the key features of the Reward-Risk Tool. The tool expands upon the traditional NASA risk matrix approach for quantifying risk, by adding a capability to quantify reward potential. The likelihood and consequence of each potential risk and reward are scored, and the scores are combined to provide an overall assessment of an assumed/chosen work allocation approach (competed or directed). Risks, rewards, and scores are derived from the SWOT assessments and answers to the Key Business Questions specific to the given organization. The tool is spreadsheet-based allowing for easy population and automated calculation of overall risk and reward assessments based on the likelihood and consequence values.

The Reward-Risk Tool components shown begin with the instructions for using and populating the various worksheets with risk statements, reward statements, and scoring values. Following the instructions are the reward and risk statement worksheets for competed and directed work. The worksheets include the generic SWOT entries and related Key Business Questions developed by the Business Team. These are intended to serve only as recommended areas and questions to consider when defining risks and rewards specific to a given organization, which would then be entered into the respective worksheets. It should be noted that, to answer many of the strategic questions and complete the reward-risk analysis, knowledge of the larger organization's business processes may be needed. This is where the business modeling approach performed by the Business Models team can be applied. Understanding of the flow of work and funds across the larger organization can help identify potential strategic risks and rewards for a given project or program being addressed by these tools.

The scoring definition and scoring example worksheets are shown next. The examples provide a model for assigning the likelihood and consequence values for each risk and reward statement. The user can use these examples to customize their own scoring definitions. The reward and risk score worksheets are shown next. Once the user populates the risk and reward statements worksheets, these sheets are automatically populated with the same risk and reward statements. The likelihood and consequence values are then entered, based on the scoring definitions defined on the previous worksheet.

Upon completion of these worksheets, the final assessment and risk-reward matrix is automatically produced by the spreadsheet-based tool. Some examples of reward-risk matrices that could result from the use of this tool are shown with brief accompanying discussions. These examples highlight the range of possibilities that could result in evaluating the potential effectiveness of a directed or competed work allocation approach.

The resulting reward-risk matrix will also help define risk mitigation areas and approaches for a given project or program.

The final product included is the summary of the hypothetical rocket engine development scenario test case that was uses to demonstrate and somewhat validate the Reward-Risk Tool. This summary includes a description of the scenario itself including assumptions, and an explanation of the reward-risk assessment performed for this scenario. Following the test case summary are the components of the Reward-Risk Tool that were populated during this hypothetical project test case exercise. The use of the hypothetical test case allowed the Business Team to develop some confidence in the use of the Reward-Risk Tool.

It is recommended that the Agency use the Business Team products as tools for understanding the operating environments for competed and directed work allocation and as tools for helping to decide what funding allocation methods are most appropriate for a given directorate, program, or project. Specifically, NASA project, program, and directorate managers should use the SWOT, Key Business Questions, and Reward-Risk Tool to a) decide whether/when to use competed or directed work or both and b) identify approaches to enhance their implementation of either selected work allocation approach.

It is important to emphasize that the Business Team tools should be viewed as starting points for business strategy development. Users of these tools should tailor the tool use to their specific environment and to their specific programmatic and technical priorities. If implemented, these tools should be continually examined and tailored/modified to align with newly-released agency and national strategies, policies, and guidelines.

**Conclusions**

The business decision tools developed by the LDP 2004-05 Class, if customized and used appropriately, can assist project, program, and Mission Directorate management in deciding when to apply competed and directed work allocation approaches. Using the tools to thoroughly understand the competed and directed work operating environments and to identify risks to be mitigated can enhance the use of competition, directed work, and collaboration

The Business Team tools could be further enhanced and improved by validating the tools using actual directorate, program, or project case studies. An expanded and detailed review of the tools by NASA managers would also provide additional feedback for improving the tools and approaches presented here. Finally, continual gathering of best practices to add to the business tools would enable NASA managers to continually enhance their implementation of competition, directed work, and collaboration.

NASA Leadership Development Program 2004-05

# *Enabling Effective Collaboration and Competition at NASA*

July 2005

## Business Case Tools

## Strengths, Weaknesses, Opportunities, and Threats (SWOT) Tables & Corresponding Key Business Questions

## DIRECTED WORK
## SWOT ASSESSMENT

| SWOT ID# | A STRENGTH of directed work allocation is that NASA can use it to… | SWOT ID# | A WEAKNESS of directed work allocation by NASA is that it may… |
|---|---|---|---|
| DS-1 | Programmatic Risk: Reduce programmatic risk by using integrated internal capabilities (including critical competencies) that are unavailable or inadequate elsewhere (no outside market) | DW-1 | Innovation: Not leverage capabilities and creative ideas from outside and inside of NASA; limits advances in technical risk, performance, and cost |
| DS-2 | Flexibility and Efficiency: Reduce time, effort, and cost to initiate work | DW-2 | Productivity: Create feeling of entitlement and complacency, and potentially low productivity |
| DS-3 | Workforce Morale: Create a feeling of security and stability in staff, which can enhance commitment and performance | DW-3 | Commercial Use: Not maximize use of commercial capabilities, resulting in wasteful reinvention and duplication |
| DS-4 | External Collaboration: Enable open information exchange with external organizations | DW-4 | Private Sector: Not advance private sector capabilities as quickly or certainly, because an additional technology transfer step must be undertaken |
| DS-5 | Center Budgeting: Enable Centers to plan future budgets given workforce constraints and relatively known funding | DW-5 | Political: Not support current political policies regarding out-sourcing or private sector participation. |
| DS-6 | Strategic Research: Allow for the support of long-term, generational technology and research programs that might be unsustainable at other organizations | DW-6 | Workforce Validation: Not leverage competition to validate whether NASA competencies are sharp or relevant |
| DS-7/ | Mission Focus: Maintain focus of critical personnel on NASA mission | DW-7 | Accountability: Obscure accountability for Budget and Performance Integration |
| | | DW-8 | Ability to Compete: Not enhance NASA workforce ability to win competed work |
| | | DW-9 | Best Value: Not drive cost effectiveness, particularly in administrative overhead |
| | | DW-10 | Non-Essential Infrastructure and Activities: Support non-essential infrastructure and activities |

## DIRECTED WORK
## SWOT ASSESSMEN (CONT'D.)

| SWOT ID# | An OPPORTUNITY for directed work allocation is that NASA can use it to… | SWOT ID# | A THREAT to directed work allocation by NASA is that it may… |
|---|---|---|---|
| DO-1 | Center Relations: Provide funding to make an Organization secure in their roles, and therefore more willing to collaborate | DT-1 | Political Priorities: Ignore political pressure to outsource and compete |
| DO-2 | Critical Infrastructure: Maintain essential facilities and infrastructure | DT-2 | External Funding: Not enable or encourage workforce to win non-NASA funds for partially or intermittently funded staff and facilities |
| DO-3 | Core Competencies: Maintain or augment targeted competencies and activities | | |
| DO-4 | External Collaborations: Freely initiate collaborations with non-NASA organizations | | |
| DO-5 | Responsiveness: Respond rapidly and strategically to emergencies and new Agency, National, and political priorities | | |
| DO-6 | Even Competition: Eliminate most disadvantages when also competing, by providing effective flexibility in managing staff, and by providing partial funding for those seeking competed funds | | |

## COMPETED WORK
## SWOT ASSESSMENT

| SWOT ID# | A STRENGTH of competed work allocation is that NASA can use it to… | SWOT ID# | A WEAKNESS of competed work allocation by NASA is that it may… |
|---|---|---|---|
| CS-1 | Innovation: Leverage the best capabilities and creative ideas from outside and inside of NASA; enables breakthroughs in technical risk, performance, and cost when a market exists | CW-1 | Programmatic Risk: Increase programmatic risk when using "unknown" external capabilities for technically complex work, with less control |
| CS-2 | Productivity: Create competitive energy, which drives high productivity | CW-2 | Flexibility and Efficiency: Increase time, effort, cost, and regulation to initiate work |
| CS-3 | Commercial Use: Maximize use of commercial capabilities, eliminating wasteful reinvention and duplication | CW-3 | Workforce Morale: Create a feeling of insecurity and instability in staff, which can diminish commitment and performance |
| CS-4 | Private Sector: Advance private sector capabilities to improve the economy and long-term support of the NASA mission | CW-4 | External Collaboration: Raise conflicts limiting open informatino exchange with potential competitors. |
| CS-5 | Political: Support current political policies regarding out-sourcing or private sector participation. | CW-5 | Center Budgeting: Prevent Centers from planning future budgets as accurately given workforce constraints and uncertain funding |
| CS-6 | Workforce Validation: Maximally validate that NASA competencies are sharp and relevant | CW-6 | Strategic Research: Make it difficult to sustain long-term, generational technology and research programs |
| CS-7 | Accountability: Clearly define accountability for Budget and Performance Integration | CW-7 | Mission Focus: Distract the focus of critical personnel from NASA mission |
| CS-8 | Ability to Compete: Enhance NASA workforce ability to win competed work | | |
| CS-9 | Best Value: Drive cost effectiveness, particularly in administrative overhead | | |
| CS-10 | Non-Essential Infrastructure and Activities: Identify non-essential or non-competitive infrastructure and activities | | |

## COMPETED WORK
## SWOT ASSESSMENT (CONT'D.)

| SWOT ID# | An OPPORTUNITY for competed work allocation is that NASA can use it to… | SWOT ID# | A THREAT of competed work allocation by NASA is that it may… |
|---|---|---|---|
| CO-1 | Political Priorities: Align with political priorities and policies to outsource and compete | CT-1 | Programmatic Risk: Increase programmatic risk when using "unknown"external capabilities for technically complex work, with less control |
| CO-2 | External Funding: Enable and encourage workforce to win non-NASA funds for partially or intermittently funded staff and facilities | CT-2 | Flexibility and Efficiency: Increase time, effort, cost, and regulation to initiate work |
| CO-3 | Project Collaboration: Encourage collaborations with outside organizations | CT-3 | Workforce Morale: Create a feeling of insecurity and instability in staff, which can diminish commitment and performance |
| CO-4 | Support Facilities: Compete for external funding and customers to support important NASA facilities | CT-4 | External Collaboration: Raise conflicts limiting open informatino exchange with potential competitors. |
| | | CT-5 | Center Budgeting: Prevent Centers from planning future budgets as accurately given workforce constraints and uncertain funding |
| | | CT-6 | Strategic Research: Make it difficult to sustain long-term, generational technology and research programs |
| | | CT-7 | Mission Focus: Distract the focus of critical personnel from NASA mission |

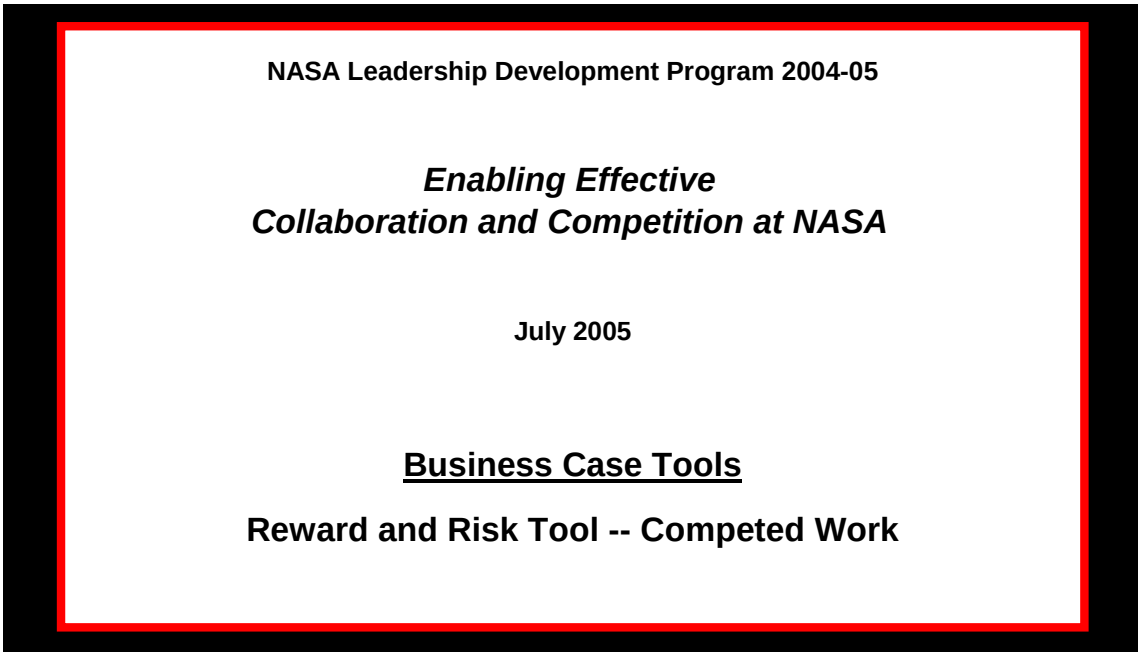
## KEY STRATEGIC BUSINESS QUESTIONS
## For
## NASA PROGRAM AND PROJECT MANAGERS

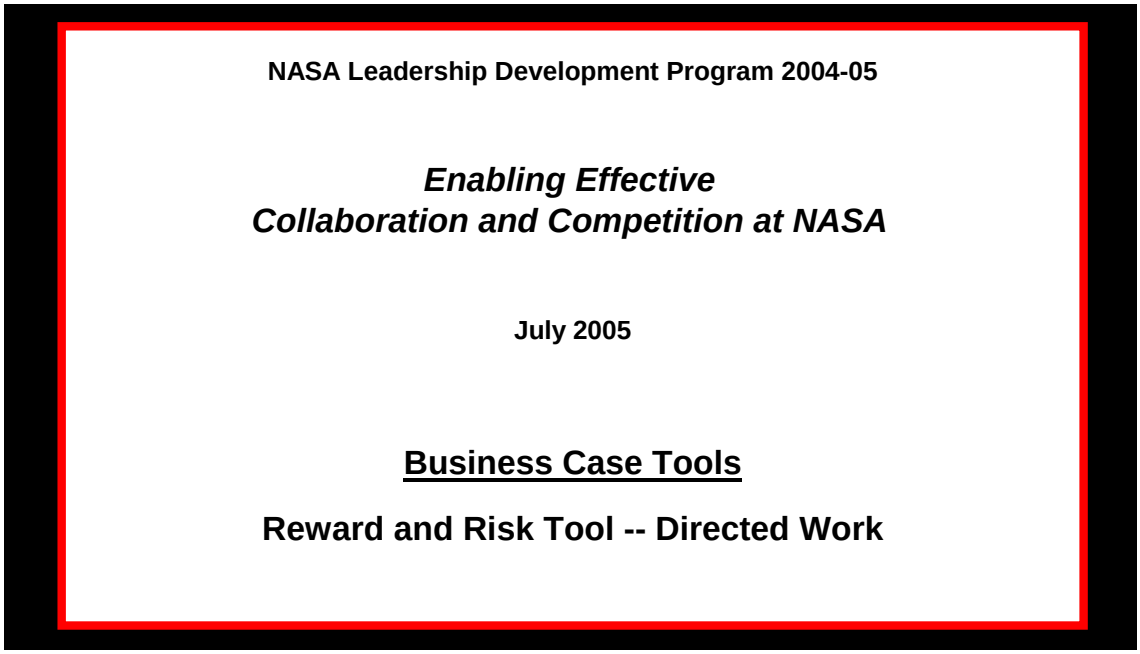
| DIRECTED WORK QUESTIONS | COMPETED WORK QUESTIONS |
|---|---|
| DS-1: What are the core competencies needed for this effort? Are the critical competencies adequately being "protected" by existing projects and funds? | CW-1: Have the capabilities of the external organization been properly researched? Is past performance known? |
| DS-2/CW-2: What are the costs associated with initiating the directed work versus competing it? How does this impact the life cycle cost? | |
| DS-3/CW-3: What is the current "morale temperature?" Will this business decision have a significant affect on morale? | |
| DS-4/CW-4: What data/information sharing restrictions will apply under directed and competed methods? How will these restrictions impact future competitiveness and overall missions success? | |
| DS-5/CW-5: Will the decision to direct or compete this work have an impact on Center ability to plan future budgets? | |
| DS-6/CW-6: What technologies and research are critical to near-term and long-term mission success? How will the business decision impact the ability to sustain needed research and technology? | |
| DS-7/CW-7: Will the necessity to seek out and prepare for competitions (e.g. proposal writing) draw critical personnel away from performing needed work? How will this impact mission success and workforce morale? | |
| DW-1/CS-1: Is a new capability or concept being developed? Could ideas, knowledge, or capabilities outside of NASA significantly benefit the effort? | |
| DW-2/CS-2: What is the current "morale temperature?" Will this business decision have a significant affect on workface productivity or creativity? | |
| DS-3/CS-3: Is this effort appropriate for NASA? Do outside organizations already have the capabilities required for this effort? | |
| DW-4/CS-4: How readily might this capability be supplied to NASA by the private sector? What is the commercial potential for this capability? | |
| DW-5/CS-5: How does the business decision align with current national and agency strategies and policies regarding outsourcing, competition, or private sector participation? (e.g. President's Management Agenda, OMB PART, NASA Strategic Plan, Directorate Strategy, Program Strategy, outsourcing requirements, other agency guidelines such as CWG Principles for Healthy Competition....) | |

| | |
|---|---|
| DW-6/CS-6: What competencies are needed for this effort? What methods have recently been used or will be used to ensure that these competencies are at the needed performance and skill level and that these competencies are relevant? | |
| DW-7/CS-7: What methods will be used to track performance and budget? Are the methods responsive to current guidance or policy? (e.g. President's Management Agenda, OMB-PART, etc.) | |
| DW-8: Will this effort be directed for the long term? If not, will the workforce need to compete to protect critical skills or capabilities? Will these competencies need to compete for non-NASA funds? | |
| DW-9/CS-9: What are the projected life cycle costs for both work allocation approaches? Can cost savings in one or more project phases impact to the overall life cycle cost or provide other benefits to mission or organizational success? | |
| DW-10: Has an assessment of essential capabilities been recently performed? Could this effort unnecessarily preserve certain capabilities? | |
| DO-1/CT-1: What are the realistic concerns with collaboration and how can these be overcome for this effort? Is collaboration an important element of this effort? | |
| DO-2/CT-2: What facilities and infrastructure are needed for this effort? Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?) Are other programs and projects planning to fund these capabilities currently or in the long term? | |
| DO-3/CT-3: What core competencies are needed for this effort? Will this effort secure the availability of the competency as long as it is needed for this effort? Are other programs currently funding or planning to fund these competencies? | |
| DO-4/CT-4: What are the realistic concerns with collaboration and how can these be overcome for this effort? Is collaboration an important element of this effort? | |
| | CT-5: Is this effort capable of responding to quick-turnaround actions driven by national or local emergencies (e.g. disasters) or by top-down redirection (e.g. Congressional action)? |

| | |
|---|---|
| | CT-6: What methods or procedures are currently available to "level the competitive playing field" for NASA? Can any of these be applied? |
| DT-1/CO-1: What is the current guidance or policy regarding outsourcing and competition? Does this effort align with current policy? Do other programs and projects sufficiently align so that this aspect is not a factor for this effort? | |
| DT-2: Will this effort be directed for the long term? If not, will the workforce need to compete to protect critical skills or capabilities? | |
| | CO-3: Is collaboration an important element of this effort? |
| | CO-4: What facilities and infrastructure are needed for this effort? Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?) Are other programs and projects planning to fund these capabilities currently or in the long term? |

**Reward and Risk Tool – "TITLE PAGE"**



## Reward and Risk Tool – Competed Work / "INSTRUCTIONS"

| Step | Worksheet | Instructions |
|---|---|---|
| 1 | **REWARD STATEMENTS** | Based upon the information provided and taking into consideration the particulars of the proposed work, derive tailored Reward Statements pertaining to this work. Note that Reward Statements describe potential rewards that may or may not occur; these statements could be derived from the stengths and opportunities identified in the organization's SWOT assessment. What should be explicitly presented here for the purposes of decision making are those potential rewards arising specifically due to the decision to use competed work to accomplish the task. |
| 2 | **RISK STATEMENTS** | Based upon the information provided and taking into consideration the particulars of the proposed work, derive tailored Reward Statements pertaining to this work. Note that Risk Statements describe potential issues that may or may not occur; these statements could be derived from the weaknesses and threats identified in the organization's SWOT assessment. What should be explicitly presented here for the purposes of decision making are those potential risks arising specifically due to the decision to use competed work to accomplish the task. |
| 3 | **SCORING DEFINITIONS (optional)** | Provide definitions for the scoring to be used for the Reward and Risk statements. Use the worksheet titled "SCORING DEF EXAMPLES" as a starting points but, where possible, add detail and quantification specific to the context of the proposed work. |
| 4 | **REWARD SCORING** | Using the derived scoring definitions for the likelihood and consequences of potential rewards, score the list of tailored Reward Statements in these two areas. These scores, just like the statements themselves, should reflect the particular context within which the proposed work will be performed. |
| 5 | **RISK SCORING** | Using the derived scoring definitions for the likelihood and consequences of potential risks, score the list of tailored Risk Statements in these two areas. These scores, just like the statements themselves, should reflect the particular context within which the proposed work will be performed. |
| 6 | **R&R MATRIX** | Observe the relative balance of potential Rewards and Risks due to using the competed work approach. Consider if this is, after all the correct approach. Use the worksheet "R&R EXAMPLES" as a basic guideline for matrix interpretation. If this is, in the end, the programmic approach chosen, then use the scoring sheet recommendations to develop Reward Capture Plans and Risk Mitigation Plans as part of the strategic planning for this work. |

## Reward and Risk Tool – Directed Work / "INSTRUCTIONS"

| Step | Worksheet | Instructions |
|---|---|---|
| 1 | **REWARD STATEMENTS** | Based upon the information provided and taking into consideration the particulars of the proposed work, derive tailored Reward Statements pertaining to this work. Note that Reward Statements describe potential rewards that may or may not occur; these statements could be derived from the stengths and opportunities identified in the organization's SWOT assessment. What should be explicitly presented here for the purposes of decision making are those potential rewards arising specifically due to the decision to use directed work to accomplish the task. |
| 2 | **RISK STATEMENTS** | Based upon the information provided and taking into consideration the particulars of the proposed work, derive tailored Reward Statements pertaining to this work. Note that Risk Statements describe potential issues that may or may not occur; these statements could be derived from the weaknesses and threats identified in the organization's SWOT assessment. What should be explicitly presented here for the purposes of decision making are those potential risks arising specifically due to the decision to use directed work to accomplish the task. |
| 3 | **SCORING DEFINITIONS (optional)** | Provide definitions for the scoring to be used for the Reward and Risk statements. Use the worksheet titled "SCORING DEF EXAMPLES" as a starting points but, where possible, add detail and quantification specific to the context of the proposed work. |
| 4 | **REWARD SCORING** | Using the derived scoring definitions for the likelihood and consequences of potential rewards, score the list of tailored Reward Statements in these two areas. These scores, just like the statements themselves, should reflect the particular context within which the proposed work will be performed. |
| 5 | **RISK SCORING** | Using the derived scoring definitions for the likelihood and consequences of potential risks, score the list of tailored Risk Statements in these two areas. These scores, just like the statements themselves, should reflect the particular context within which the proposed work will be performed. |
| 6 | **R&R MATRIX** | Observe the relative balance of potential Rewards and Risks due to using the directed work approach. Consider if this is, after all the correct approach. Use the worksheet "R&R EXAMPLES" as a basic guideline for matrix interpretation. If this is, in the end, the programmic approach chosen, then use the scoring sheet recommendations to develop Reward Capture Plans and Risk Mitigation Plans as part of the strategic planning for this work. |

## Reward and Risk Tool – Competed Work / "REWARD STATEMENTS"

### REWARD STATEMENTS

| # | Recommended Area of Consideration | User Tailored Reward Statements<br>"Given that this project will use competed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Innovation:** Use of competed work may leverage the best capabilities and creative ideas from outside and inside of NASA; enables breakthroughs in technical risk, performance, and cost.<br><br>Is a new capability or concept being developed?<br><br>Could ideas, knowledge, or capabilities outside of NASA significantly benefit the effort? | |
| 2 | **Productivity:** Use of competed work may create competitive energy, which drives high productivity.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on workface productivity or creativity?<br><br>Is there a competitive market for this work, either inside NASA or broadly? | |
| 3 | **Commercial Use:** Use of competed work may maximize the use of commercial capabilities, eliminating wasteful reinvention and duplication.<br><br>Is this effort appropriate for NASA?<br><br>Do outside organizations already have the capabilities required for this effort? | |
| 4 | **Private Sector:** Use of competed work may advance private sector capabilities to improve the economy and long-term support of the NASA mission.<br><br>How readily might this capability be supplied to NASA by the private sector?<br><br>What is the commercial potential for this capability? | |
| 5 | **Political:** Use of competed work may support current political policies regarding out-sourcing or private sector participation.<br><br>How does the business decision align with current national and agency strategies and policies regarding outsourcing, competition, or private sector participation? (e.g. President's Management Agenda, OMB PART, NASA Strategic Plan, Directorate Strategy, Program Strategy, outsourcing requirements, other agency guidelines such as CWG Principles for Healthy Competition....) | |
| 6 | **Workforce Validation:** Use of competed work may maximally validate that NASA competencies are sharp and relevant.<br><br>What competencies are needed for this effort?<br><br>What methods have recently been used or will be used to ensure that these competencies are at the needed performance and skill level and that these competencies are relevant? | |

## Reward and Risk Tool – Competed Work / "REWARD STATEMENTS" (continued)

| | | |
|---|---|---|
| **7** | **Accountability:** Use of competed work may clearly define accountability for budget and performance integration.<br><br>What methods will be used to track performance and budget?<br><br>Are the methods responsive to current guidance or policy? (e.g. President's Management Agenda, OMB-PART, etc.) | |
| **8** | **Ability to Compete:** Use of competed work may enhance NASA workforce ability to win competed work. | |
| **9** | **Best Value:** Use of competed work may drive cost effectiveness, particularly in administrative overhead.<br><br>What are the projected life cycle costs for both work allocation approaches?<br><br>Can cost savings in one or more project phases impact the overall life cycle cost or provide other benefits to mission or organizational success? | |
| **10** | **Non-Essential Infrastructure and Activities:** Use of competed work may help identify non-essential or non-competitive infrastructure and activities.<br><br>Has an assessment of essential capabilities been recently performed? | |
| **11** | **Political Priorities:** Use of **c**ompeted work may better align with political priorities and policies to outsource and compete.<br><br>What is the current guidance or policy regarding outsourcing and competition?<br><br>Does this effort align with current policy?<br><br>Do other programs and projects sufficiently align so that this aspect is not a factor for this effort? | |
| **12** | **External Funding:** Use of competed work may enable and encourage workforce to win non-NASA funds for partially or intermittently funded staff and facilities. | |
| **13** | **Project Collaboration:** Use of competed work may encourage collaborations with outside organizations.<br><br>Is collaboration an important element of this effort? | |
| **14** | **Support Facilities:** Use of competed work may lead to enhanced competition for external funding and customers to support important NASA facilities.<br><br>What facilities and infrastructure are needed for this effort?<br><br>Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?)<br><br>Are other programs and projects planning to fund these capabilities currently or in the long term? | |
| **15** | | |
| **16** | | |

## Reward and Risk Tool – Directed Work / "REWARD STATEMENTS"

### REWARD STATEMENTS

| # | Recommended Area of Consideration | User Tailored Reward Statements<br>"Given that this project will use directed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Programmatic Risk:** Use of directed work may reduce programmatic risk by using integrated internal capabilities (including critical competencies) that are unavailable or inadequate elsewhere.<br><br>What are the core competencies needed for this effort?<br><br>Are the critical competencies adequately being "protected" by existing projects and funds? | |
| 2 | **Flexibility and Efficiency:** Use of directed may reduce time, effort, and cost to initiate work.<br><br>What are the costs associated with initiating the directed work versus competing it?<br><br>How does this impact the life cycle cost? | |
| 3 | **Workforce Morale:** Use of directed work may create a feeling of security and stability in staff, which can enhance commitment and performance.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on morale? | |
| 4 | **External Collaboration:** Use of directed work may enable open information exchange with external organizations.<br><br>What data/information sharing restrictions will apply under directed and competed methods?<br><br>How will these restrictions impact future competitiveness and overall missions success? | |
| 5 | **Center Budgeting:** Use of directed work may enable Centers to plan future budgets given workforce constraints and relatively known funding.<br><br>Will the decision to direct or compete this work have an impact on Center ability to plan future budgets? | |
| 6 | **Strategic Research:** Use directed work may allow for the support of long-term, generational technology and research programs that might be unsustainable at other organizations.<br><br>What technologies and research are critical to near-term and long-term mission success?<br><br>How will the business decision impact the ability to sustain needed research and technology? | |

## Reward and Risk Tool – Directed Work / "REWARD STATEMENTS" (continued)

| | | |
|---|---|---|
| 7 | **Mission Focus:** Use of directed work may maintain focus of critical personnel on NASA mission.<br><br>Will the necessity to seek out and prepare for competitions (e.g. proposal writing) draw critical personnel away from performing needed work?<br><br>How will this impact mission success and workforce morale? | |
| 8 | **Center Relations:** Use of directed work may provide funding to make an Organization secure in their roles, and therefore more willing to collaborate.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | |
| 9 | **Critical Infrastructure:** Use of directed work may help maintain essential facilities and infrastructure.<br><br>What facilities and infrastructure are needed for this effort?<br><br>Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?)<br><br>Are other programs and projects planning to fund these capabilities currently or in the long term? | |
| 10 | **Core Competencies:** Use of directed work may help maintain or augment targeted competencies and activities.<br><br>What core competencies are needed for this effort?<br><br>Will this effort secure the availability of the competency as long as it is needed for this effort?<br><br>Are other programs currently funding or planning to fund these competencies? | |
| 11 | **External Collaborations:** Use of directed work may lead to freely initiated collaborations with non-NASA organizations.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | |
| 12 | **Responsiveness:** Use of directed work may lead to rapid and strategic response to emergencies and new Agency, National, and political priorities.<br><br>Is it likely that this work will be required to respond shifts in priorities? | |
| 13 | **Even Competition:** Use of directed work can eliminate most disadvantages when also competing elsewhere, by providing effective flexibility in managing staff, and by providing partial funding for those seeking competed funds. | |
| 14 | | |
| 15 | | |

## Reward and Risk Tool – Competed Work / "RISK STATEMENTS"

# RISK STATEMENTS

| # | Recommended Area of Consideration | User Tailored Risk Statements<br>"Given that this project will use competed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Programmatic Risk:** Use of competed work may increase programmatic risk when using "unknown"external capabilities for technically complex work, with less control.<br><br>Have the capabilities of the external organization been properly researched?<br><br>Is past performance known? | |
| 2 | **Flexibility and Efficiency:** Use of competed may increase time, effort, cost, and regulatory requirements to initiate work.<br><br>What are the costs associated with initiating the directed work versus competing it?<br><br>How does this impact the life cycle cost? | |
| 3 | **Workforce Morale:** Use of competed work may create a feeling of insecurity and instability in staff, which can diminish commitment and performance.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on morale? | |
| 4 | **External Collaboration:** Use of competed work may raise conflicts limiting open information exchange with potential competitors.<br><br>What data/information sharing restrictions will apply under directed and competed methods?<br><br>How will these restrictions impact future competitiveness and overall missions success? | |
| 5 | **Center Budgeting:** Use of competed work may prevent Centers from planning future budgets as accurately given workforce constraints and uncertain funding.<br><br>Will the decision to direct or compete this work have an impact on Center ability to plan future budgets? | |
| 6 | **Strategic Research:** Use of competed work may make it difficult to sustain long-term, generational technology and research programs.<br><br>What technologies and research are critical to near-term and long-term mission success?<br><br>How will the business decision impact the ability to sustain needed research and technology? | |

## Reward and Risk Tool – Competed Work / "RISK STATEMENTS" (continued)

| | | |
|---|---|---|
| 7 | **Mission Focus:** Use of competed work may distract the focus of critical personnel from NASA mission.<br><br>Will the necessity to seek out and prepare for competitions (e.g. proposal writing) draw critical personnel away from performing needed work?<br><br>How will this impact mission success and workforce morale? | |
| 8 | **Center Relations:** Use of competed work may make organizations feel insecure in their roles and funding, and may therefore be less willing to collaborate, or to share competition best-practices.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | |
| 9 | **Critical Infrastructure:** Use of competed work may erode essential facilities and infrastructure.<br><br>What facilities and infrastructure are needed for this effort?<br><br>Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?)<br><br>Are other programs and projects planning to fund these capabilities currently or in the long term? | |
| 10 | **Core Competencies:** Use of competed work may erode core competencies and essential activities.<br><br>What core competencies are needed for this effort?<br><br>Will this effort secure the availability of the competency as long as it is needed for this effort?<br><br>Are other programs currently funding or planning to fund these competencies? | |
| 11 | **External Collaborations:** Use of competed work may harm collaborations with non-NASA organizations competing for the same funds and work.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | |
| 12 | **Responsiveness:** Use of competed work may hinder focused and rapid response to emergencies and new Agency, National and political priorities.<br><br>Is this effort capable of responding to quick-turnaround actions driven by national or local emergencies (e.g. disasters) or by top-down redirection (e.g. Congressional action)? | |
| 13 | **Uneven Competition:** Use of competed work may put NASA at a disadvantage, because NASA is required to disseminate its research results, cannot manage staff as flexibly, and is often competing against university employees or students who don't have to seek their full cost.<br><br>What methods or procedures are currently available to "level the competitive playing field" for NASA?<br><br>Can any of these be applied? | |
| 14 | | |

## Reward and Risk Tool – Directed Work / "RISK STATEMENTS"

# RISK STATEMENTS

| # | Recommended Area of Consideration | User Tailored Risk Statements<br>"Given that this project will use directed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Innovation:** Use of directed may not leverage capabilities and creative ideas from outside and inside of NASA; limits advances in technical risk, performance, and cost.<br><br>Is a new capability or concept being developed?<br><br>Could ideas, knowledge, or capabilities outside of NASA significantly benefit the effort? | |
| 2 | **Productivity:** Use of directed work may create feelings of entitlement and complacency, and potentially result in low productivity.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on workface productivity or creativity? | |
| 3 | **Commercial Use:** Use of directed work may not maximize the use of commercial capabilities, resulting in wasteful reinvention and duplication.<br><br>Is this effort appropriate for NASA?<br><br>Do outside organizations already have the capabilities required for this effort? | |
| 4 | **Private Sector:** Use of directed may not advance private sector capabilities as quickly or certainly, because an additional technology transfer step must be undertaken.<br><br>How readily might this capability be supplied to NASA by the private sector?<br><br>What is the commercial potential for this capability? | |
| 5 | **Political:** Use of directed work may not support current political policies regarding out-sourcing or private sector participation.<br><br>How does the business decision align with current national and agency strategies and policies regarding outsourcing, competition, or private sector participation? (e.g. President's Management Agenda, OMB PART, NASA Strategic Plan, Directorate Strategy, Program Strategy, outsourcing requirements, other agency guidelines such as CWG Principles for Healthy Competition....) | |
| 6 | **Workforce Validation:** Use of directed work may not leverage competition to validate whether NASA competencies are sharp or relevant.<br><br>What competencies are needed for this effort?<br><br>What methods have recently been used or will be used to ensure that these competencies are at the needed performance and skill level and that these competencies are relevant? | |

## Reward and Risk Tool – Directed Work / "RISK STATEMENTS" (continued)

| | | |
|---|---|---|
| 7 | **Accountability:** Use of directed work may obscure accountability for budget and performance integration.<br><br>What methods will be used to track performance and budget?<br><br>Are the methods responsive to current guidance or policy? (e.g. President's Management Agenda, OMB-PART, etc.) | |
| 8 | **Ability to Compete:** Use of directed work may not enhance NASA workforce ability to win competed work.<br><br>Will this effort be directed for the long term?<br><br>If not, will the workforce need to compete to protect critical skills or capabilities?<br><br>Will these competencies need to compete for non-NASA funds? | |
| 9 | **Best Value:** Use of directed work may not drive cost effectiveness, particularly in administrative overhead.<br><br>What are the projected life cycle costs for both work allocation approaches?<br><br>Can cost savings in one or more project phases impact the overall life cycle cost or provide other benefits to mission or organizational success? | |
| 10 | **Non-Essential Infrastructure and Activities:** Use of directed work may support the maintenance of non-essential infrastructure and activities.<br><br>Has an assessment of essential capabilities been recently performed?<br><br>Could this effort unnecessarily preserve certain capabilities? | |
| 11 | **Political Priorities:** Use of directed work may ignore political pressure to outsource and compete.<br><br>What is the current guidance or policy regarding outsourcing and competition?<br><br>Does this effort align with current policy?<br><br>Do other programs and projects sufficiently align so that this aspect is not a factor for this effort? | |
| 12 | **External Funding:** Use of directed may not enable or encourage workforce to win non-NASA funds for partially or intermittently funded staff and facilities.<br><br>Will this effort be directed for the long term?<br><br>If not, will the workforce need to compete to protect critical skills or capabilities? | |
| 13 | | |
| 14 | | |

## Reward and Risk Tool – "SCORING DEFINITIONS"

### REWARDS

| Likelihood Score | Likelihood Definitions |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |

**Note:**
**This page is to be used as a reference for the user when performing the scoring of the various Reward and Risk Statements. The goal is to provide a resource for consistent definitions leading to consistent scoring. As much quantification as possible is helpful.**

| Consequences Score | Consequences Definitions | | |
|---|---|---|---|
| | Performance | Schedule | Cost |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

### RISKS

| Likelihood Score | Likelihood Definitions |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |

| Consequences Score | Consequences Definitions | | |
|---|---|---|---|
| | Performance | Schedule | Cost |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

## Reward and Risk Tool – "SCORING DEFINITIONS"

### REWARDS

| Likelihood Score | Likelihood Definitions |
|---|---|
| 1 | Very unlikely to occur |
| 2 | Not likely to occur |
| 3 | May occur |
| 4 | Highly likely to occur |
| 5 | Nearly certain to occur |

**Note:**
**This page contains example qualitative descriptions of the various scoring categories.**

| Consequences Score | Consequences Definitions | | |
|---|---|---|---|
| | Performance | Schedule | Cost |
| 1 | Minimal impact, performance unaffected. | Minimal impact, virtually no effect schedule. | No significant cost savings. |
| 2 | Slight impact, overall system performance not enhanced, but some elements improved. | Slight impact, some scheduling tension may be eased for some elements of the project. | Slight cost savings. |
| 3 | Moderate impact, overall system performance enhanced. | Moderate impact, tensions and conflicts eased with regards to meeting milestone schedule. | Moderate cost savings. |
| 4 | High impact, overall system performance enhanced significantly. | Major impact, meeting major milestones significantly more likely to occur. | Significant cost savings. |
| 5 | Very high impact, overall system performance elevated to world class. | Very high impact, meeting milestones and detailed schedule virtually assured with the genuine potential of early delivery. | Major cost savings to the point where expansion of the original goals might be warranted.. |

### RISKS

| Likelihood Score | Likelihood Definitions |
|---|---|
| 1 | Very unlikely to occur |
| 2 | Not likely to occur |
| 3 | May occur |
| 4 | Highly likely to occur |
| 5 | Nearly certain to occur |

| Consequences Score | Consequences Definitions | | |
|---|---|---|---|
| | Performance | Schedule | Cost |
| 1 | Minimal impact, overall system performance unaffected. | Minimal schedule slip. | No significant cost increase. |
| 2 | Slight impact, overall system performance below goal but acceptable. | Slight impact, additional resources required to maintain acceptable schedule. | Slight budget increase. |
| 3 | Moderate impact, system performance below goal and unacceptable. | Moderate impact, will cause intermediate dates to slip but critical path unaffected. | Moderate budget increase. |
| 4 | High impact, overall system performance below acceptable limits | Major impact, critical path affected. | Significant cost impact. |
| 5 | Very high impact making system performance unacceptable. | Critial schedule slip, major milestones in jeopardy. | Major cost impact with potential devastating programmatic results. |

**Reward and Risk Tool – "REWARD SCORING SHEET"**

High Reward
Moderate Reward
Low Reward

## REWARDS

| # | Reward Statements | Likelihood | Consequences | Color Rating |
|---|---|---|---|---|
| 1 | | 0 | 0 | |
| 2 | | 0 | 0 | |
| 3 | | 0 | 0 | |

**Reward and Risk Tool – "RISK SCORING SHEET"**

Low Risk
Moderate Risk
High Risk

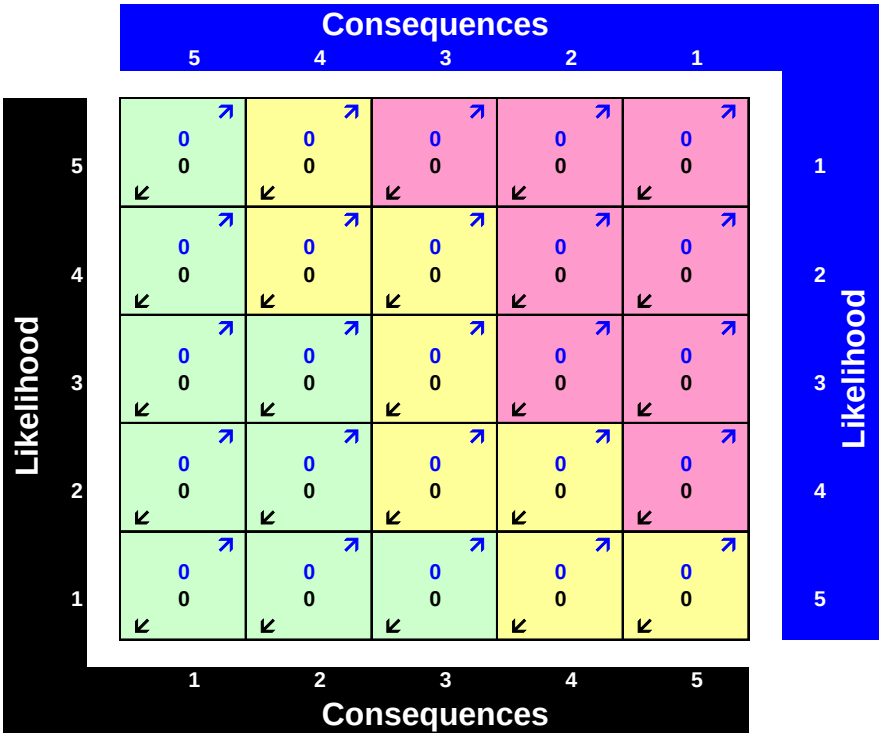
## RISKS

| # | Risk Statements | Likelihood | Consequences | Color Rating |
|---|---|---|---|---|
| 1 | | 0 | 0 | |
| 2 | | 0 | 0 | |
| 3 | | 0 | 0 | |

**Reward and Risk Tool – "R&R MATRIX"**

# R&R Matrix

**REWARDS**

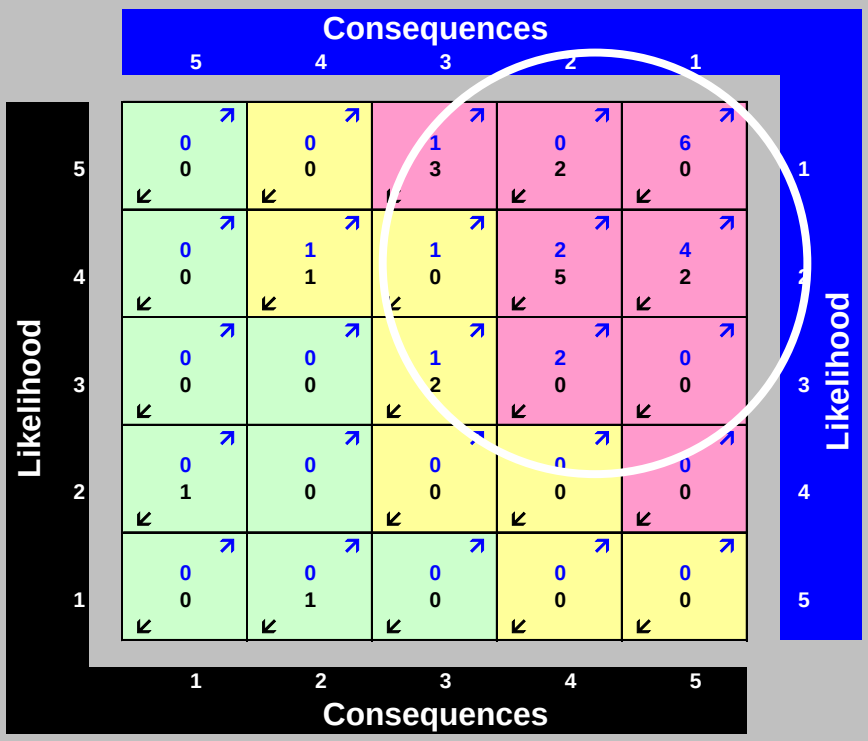



**RISKS**

# Summary Tally

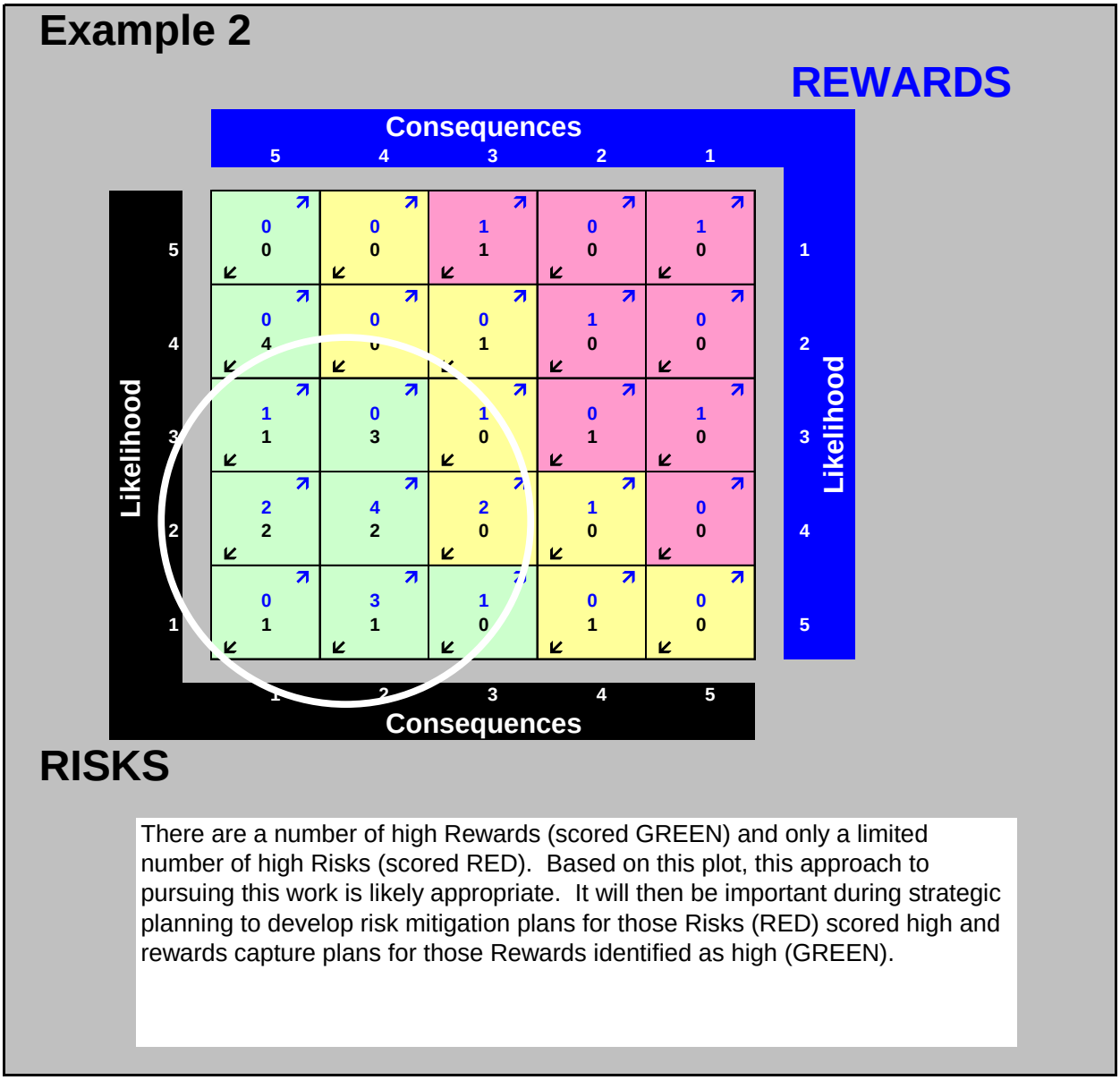
| | High | Medium | Low |
|---|---|---|---|
| **Rewards** | 0 | 0 | 0 |
| **Risks** | 0 | 0 | 0 |

# Example 1



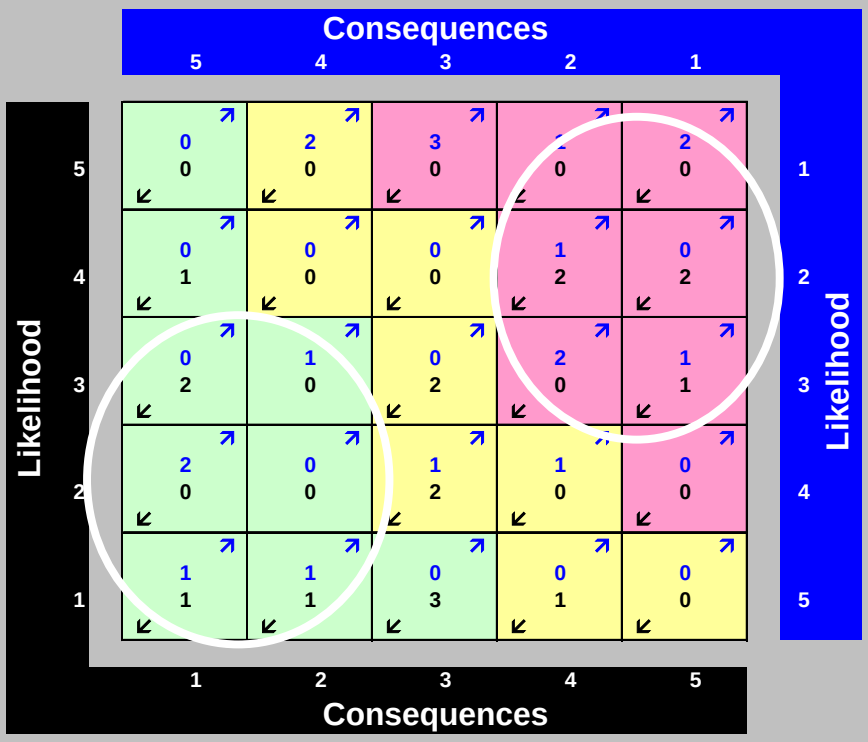

The plotted Rewards are low (scored RED) and there are a number of high Risks (scored RED). This would indicate that this approach is likely not the appropriate manner to pursue this work.

## Example 2




There are a number of high Rewards (scored GREEN) and only a limited number of high Risks (scored RED). Based on this plot, this approach to pursuing this work is likely appropriate. It will then be important during strategic planning to develop risk mitigation plans for those Risks (RED) scored high and rewards capture plans for those Rewards identified as high (GREEN).

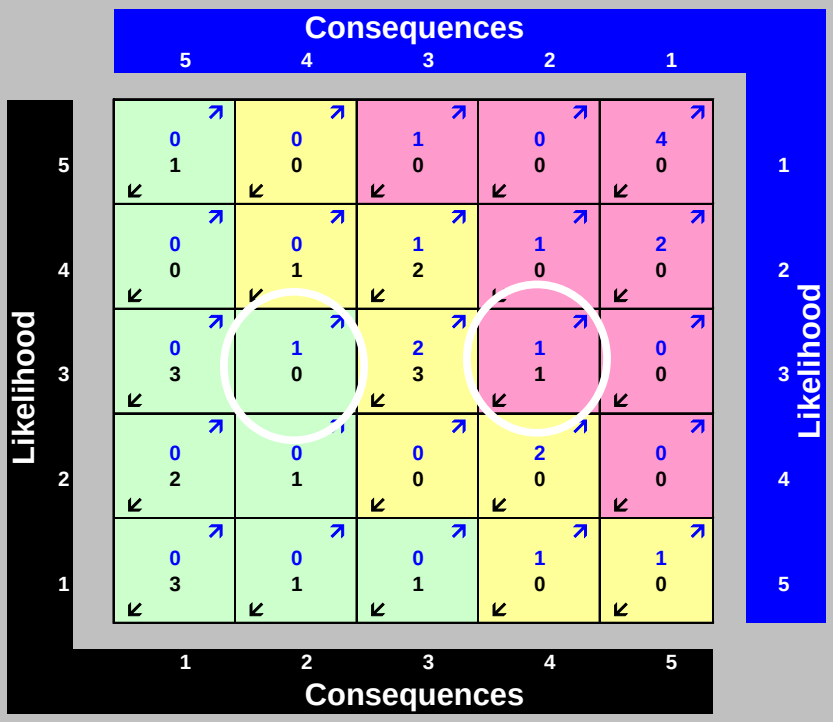
# Example 3




There are several Rewards that are high (scored GREEN) but there are also a number of high Risks (scored RED). This would mark a high-Reward / high-Risk situation and should only probably be pursued with a very strong commitment to strategic planning. Another approach would be to investigate if the proposed work could be broken into separate parts, one using directed work and another competition, and thereby mitigate some of the high Risks while capturing the high Rewards.

## Example 4

**REWARDS**




**RISKS**

There are neither very many high Rewards nor are there very many high Risks. This would suggest that the influence of the decision between directed or competed work is not a strong driver with regards to the success of the proposed work.

**NASA Leadership Development Program 2004-05**

# *Enabling Effective Collaboration and Competition at NASA*

**July 2005**

## Business Case Tools

## Liquid Propellant Rocket Engine Case Study and Tool Demonstration

# Pseudo-Hypothetical Engine Development Scenario: Demonstration and Evaluation Using Reward and Risk Tool

**Factual Background:**

As part of the initiative to expand exploration at NASA, the plans are currently being made for the development of a launch vehicle capable of supporting Lunar and Martian missions. One of the primary, long-lead items necessary for any launch vehicle is the propulsion system, specifically the liquid propellant rocket engines. Historically, the development of a new liquid propellant rocket engine takes anywhere from six to nine years, depending upon size and complexity. Thus, time is of the essence.

The currently available and in production fleet of rocket engines offer some suitable alternatives for use as first-stage boosters. However, there are very few and very limited liquid propellant rocket engine options for upper stage and trans-planetary usage. Space Shuttle, the workhorse NASA vehicle for the last quarter century, does not use upper stage engines so interest in this area has been lacking for quite some time. Those engines used during the Apollo program have been out of production for over thirty years so the resurrection of these machines would be nearly tantamount to development from scratch, despite their history. Further, they are of lower-than-optimal performance.

Other upper stage engines in existence within the US are not of the correct size or performance to meet the needs of the proposed family of vehicles. There may be some engines that could hypothetically fit the bill on the international market, but they carry along numerous issues relating to export restrictions and the strict requirements for human rating of NASA systems.

What is desired is an upper stage liquid propellant rocket engine available as soon as possible to support the NASA exploration program. It should be US manufactured and tested, though the design could be acquired internationally. The size of the engine is roughly that same as those used during the Apollo program, but the desired engine performance is greater.

**Fictional Background:**

Engineers at a NASA center have recently patented a new engine cycle called a Gas-Generator-Augmented Expander Cycle Engine that would perfectly fit the bill for upper stage use. While currently just an idea on paper, it builds largely on previous engine technology. Nevertheless, carrying this idea forward would involve a substantial development program. NASA probably has the technical capabilities for doing this, definitely owns the necessary facilities, but typically does not undertake engine development programs in house as there linger questions as to whether strictures of civil service could meet the staffing requirements and fulfill the schedule.

There may be local companies who could lend a hand with staffing, but they offer limited experience with this technology area. Other NASA centers, though, might have complementary in-house capabilities, but the degree to which this is true has not been fully explored. It is important to note that the infrastructure for rocket engine testing has been identified as core capability facilities. So too has the area of engineering associated with

rocket engine development, though whether this requires in-house development or simply insight and oversight of contracted work is not clear.

One rocket engine company has expressed the desire to resurrect, modify, and update a version of the Apollo era engines. Thus, while this would still unquestionably be a development program, it would be based upon proven, flown technology at the heart of NASA's greatest success story. However, based upon geographical considerations, this company proposes not using the NASA infrastructure and facilities for development and certification testing. One of the proposed updates involves the use of a health-monitoring technology that, if developed and proven, could represent a future safety feature in automobiles.

Another rocket engine company has expressed the desire to buy an engine design from another country and, with the appropriate modifications for human rating, to manufacture that engine in the US. NASA has very little insight into the history of this design, but the published history is impressive. Cooperation on this program between the two countries has some appeal both within NASA and at the State Department. Further, this company lies in the district of a powerful and vocal congressman.

Note that if this work were to be openly competed, the NASA center proposal would be at a distinct disadvantage due to the inherent constraints and burdens imposed by being a governmental organization. While is it not impossible that they could compete and win, it is highly unlikely.

Thus, with regards to considering pursuing this program as directed versus competed work, there are a number of programmatic, capability, infrastructure, economic, and political facets to consider.

**Assumptions**

A Request for Information process has taken place and it would appear that the expected players will be involved, meaning the two mentioned rocket engine manufacturers and the one NASA center. Certainly other companies or entities could offer up a proposal in response to a competed Request for Proposals, but considering the knowledge of the limited industry base, this is not likely.

It has been decided that the NASA center will be allowed to compete as though it too were a rocket engine manufacturer, though the details for how this project would be monitored and managed, should the center win, have not been worked out.

Based upon historical precedent, the preliminary assumption is that this work will be competed and not directed to the NASA center to accomplish alone. However, because of the many issues involved, the Reward and Risk tool for competed work is brought forward. It has two functions in this capacity. First, it is used to as a validation for the proposed course of action – to use a competitive work allocation approach. Second, it is used to identify any significant risks that might require mitigation plans and any particular potential rewards that the agency ought to be especially keen to capture through the process of securing this rocket propulsion capability.

**Evaluation Using Reward and Risk Tool for Competed Work**

Reward and risk statements were composed based upon the assumption that this work was going to be competed. Along with these statements, descriptions of the particular situation under consideration were given. In this manner, the tool is tailored to this specific situation. These descriptions, in turn, formed the rationale for the subsequent scoring process. On the next several pages are the composed Reward Statements and then the Risk Statements along with their corresponding descriptions.

Note that in most cases the fundamental statement can be derived from the topic statement given. For example, under the topic heading Productivity, the following statement is given: "Use of competed work may create competitive energy, which drives high productivity."

The corresponding Reward Statement, using the prelude within the column header, becomes: "Given that this project will use competed work; there exists the possibility that the center's workforce will be energized by the process of competing with commercial engine developers." This is a largely straightforward grammatical transition.

However, it is in the details that the specifics get involved: "The center will be involved in the engine development process whether the engine work is competed or directed. However, the work will be substantially greater should the center actually have primary development responsibility. A competition would motivate both the NASA workforce and the contractor workforce to strive to win the contract. Likelihood is high, but the consequences are possibly not that long lasting beyond ATP [Authority to Proceed]."

The topic presented within the table thus frames the subject matter, and the discussion in miniature frames the particulars of the case at hand. Not only does this provide for unique tailoring of the tool, but it allows for total transparency of the process. Later, should anyone question the decisions made regarding this project, this tool clearly lays out the thinking that went behind these decisions. It may be that some assumptions were later found to be flawed. With new and updated knowledge in hand, the Reward and Risk tool could be suitably altered and updated. This would provide the user a measure and understanding of the sensitivity to such assumptions.

Another thing to notice in the formulation of the Reward and Risk statements is the fact that this is not a Source Evaluation Board process. It is not the job of this tool to decide whether one potential competitor is preferable to the others. Rather, the tool is solely for the purposes of considering whether this work should be competed or directed.

For example, it is known that in one case there is a distinct and identified technology transfer possibility should one of the competitors win the competition. Thus, if this work is competed, there is a possibility that this is a potential Reward. Just because the work is competed, though, does not guarantee this competitor will win. All that is known for sure is that if the work was strictly directed to the center, then there would be no chance for this particular commercial supplier to win and therefore this technology transfer opportunity might be lost. In this way, this represents a potential Reward for competing this work and tends to validate the assumed work allocation approach.

On the other hand, there is the interesting issue with regards to the second potential engine contractor and the need to build a new facility in order to manufacture the foreign-designed engine. Unquestionably this would be a serious sticking point and significant risk for a

Source Evaluation Board to consider when choosing one competitor over another. However, this did not come up as a significant discriminator here. Perhaps it could have become a part of the "Flexibility and Efficiency" Risk item, but because at least two of the potential bidders would not be hampered by this facility construction issue, it was not a primary issue for consideration here. The important point here is that this tool is not intended, nor should it be used, as something akin to a preliminary Source Evaluation Board activity; it should only consider the pragmatic elements of what would be gained or lost with either competed or directed work allocation approaches.

A final note along the lines of pragmatic realities can be directed to Risk Statement number fourteen. Here is a case where a Risk is identified that did not fall neatly within any of the prescribed topic areas. This is due to the unusual situation of a NASA center being allowed to bid in the manner of a commercial manufacturer in this case. The fact is that should the center win the competition, some of the identified Rewards might not shine so brightly due to the strictures of governmental agencies and due to the need to establish and utilize somewhat unfamiliar programmatic structures. This is an example of another way in which the tool can be tailored to a particular situation. While the topic boxes given on the left-hand side of the Reward and Risk statement tables can be used are guideposts, it is recognized that actual situations may not always be covered by the range of topics presented. Additional Rewards and Risks can be entered as needed.

## Reward Statements and Descriptions

# REWARD STATEMENTS

| # | Recommended Area of Consideration | User Tailored Reward Statements<br>"Given that this project will use competed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Innovation:** Use of competed work may leverage the best capabilities and creative ideas from outside and inside of NASA; enables breakthroughs in technical risk, performance, and cost.<br><br>Is a new capability or concept being developed?<br><br>Could ideas, knowledge, or capabilities outside of NASA significantly benefit the effort? | ...NASA will leverage new and breakthrough technologies for engine development from outside NASA.<br><br>All 3 designs have known potential new technologies, but none of them are truly breakthrough. So competition itself may not be the catalyst for innovation in this case. This, in part, is due to the overall maturity of rocket engine design and the limited number of likely bidders for this work. Thus, the likelihood is very low that competition itself with spur a technology breakthrough. |
| 2 | **Productivity:** Use of competed work may create competitive energy, which drives high productivity.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on workface productivity or creativity?<br><br>Is there a competitive market for this work, either inside NASA or broadly? | … the center's workforce willl be energized by the process of competing with commercial engine developers.<br><br>The center will be involved in the engine development process whether the engine work is competed or directed. However, the work will be substantially greater should the center actually have primary development responsibility. A competition would motivate both the NASA workforce and the contractor workforce to strive to win the contract. Likelihood is high, but the consequences are possibly not that long lasting beyond ATP. |
| 3 | **Commercial Use:** Use of competed work may maximize the use of commercial capabilities, eliminating wasteful reinvention and duplication.<br><br>Is this effort appropriate for NASA?<br><br>Do outside organizations already have the capabilities required for this effort? | … NASA will maximize the use of commercial engine development capabilties.<br><br>Past history has demonstrated that indeed there are commercial entities capable of doing this work. Further, based upon the scenario description, it is likely that if this work is competed that it will go to such a capable contractor. Thus, the likelihood is high. The consequences are likely also high based upon the fact that these capabilities within industry may not otherwise be used and so a long-term capability within the commercial sector may be lost. |
| 4 | **Private Sector:** Use of competed work may advance private sector capabilities to improve the economy and long-term support of the NASA mission.<br><br>How readily might this capability be supplied to NASA by the private sector?<br><br>What is the commercial potential for this capability? | … this work will advance private sector capabilities thereby improving the national economy.<br><br>Beyond the fixed likelihood that any work will employ a number of people (regardless of whether it is competed or directed), there is one identified possibility for a technology transfer with broad implications. No such tech transfer is identified for the other cases. Thus likelihood for this reward is moderate and the consquences are potentially higher than moderate. |
| 5 | **Political:** Use of competed work may support current political policies regarding out-sourcing or private sector participation.<br><br>How does the business decision align with current national and agency strategies and policies regarding outsourcing, competition, or private sector participation? (e.g. President's Management Agenda, OMB PART, NASA Strategic Plan, Directorate Strategy, Program Strategy, outsourcing requirements, other agency guidelines such as CWG Principles for Healthy Competition....) | … this approach will fulfill current policies recommend outsourcing.<br><br>Current policies do indeed support private sector participation when appropriate. The various documents referenced further suggest that this is an appropriate competitive work example. Further, from the scenario description there may be other political reasons for allowing the most likely bidders to compete for this contract. Thus, the likelihood is very high but the consequences are just average. The latter is the case because in a fair and open competition, such political considerations cannot play a part so the mentioned powerful |

## Reward Statements and Descriptions (continued)

| | | |
|---|---|---|
| **6** | **Workforce Validation:** Use of competed work may maximally validate that NASA competencies are sharp and relevant.<br><br>What competencies are needed for this effort?<br><br>What methods have recently been used or will be used to ensure that these competencies are at the needed performance and skill level and that these competencies are relevant? | …the NASA competencies will be validated by suceeding in competition.<br><br>Since project office location has already been selected, a certain level of skill and competency validation has already taken place. Further, it is unlikely that NASA can win this if competed. Thus, likelihood is low and the consequences are also low. |
| **7** | **Accountability:** Use of competed work may clearly define accountability for budget and performance integration.<br><br>What methods will be used to track performance and budget?<br><br>Are the methods responsive to current guidance or policy? (e.g. President's Management Agenda, OMB-PART, etc.) | … there will be clearly defined accountability for budget and performance integration.<br><br>If contactor wins this becomes a straightforward contractual envrionment with the appropriate built-in incentives. If NASA wins, additional accountbility and oversight would need to be developed (and this will be a potential risk). Thus, the likelihood is higher than average and the consequences are high based upon the agency need to demonstrate budget accountability. |
| **8** | **Ability to Compete:** Use of competed work may enhance NASA workforce ability to win competed work. | … the NASA workforce ability to compete will be enhanced.<br><br>Unquestionably a competition will help NASA improve proposal writing and overall ability to compete based upon this alone, even if the center does not win the competition. The likelihood is high, but the consequnces in this particular area of endeavor is limited since such engine development programs are few and far between. |
| **9** | **Best Value:** Use of competed work may drive cost effectiveness, particularly in administrative overhead.<br><br>What are the projected life cycle costs for both work allocation approaches?<br><br>Can cost savings in one or more project phases impact the overall life cycle cost or provide other benefits to mission or organizational success? | … cost effectiveness, particularly with regards to administrative overhead, will be enhanced.<br><br>The likely commercial bidders have in the past showed a willingness to be innovative with regards to finding ways to be cost effective. This can be written into the request for proposals. Further, the independent cost estimate for this project shows that administrative costs will be substantial so this is very important. The likelihood is better than average since it is likely that one of these contractors will win the competition and the consequences are high. |
| **10** | **Non-Essential Infrastructure and Activities:** Use of competed work may help identify non-essential or non-competitive infrastructure and activities.<br><br>Has an assessment of essential capabilities been recently performed? | … non-essential or non-competitive NASA facilities will be identified.<br><br>Test facilities are the only NASA infrastructure items identified. These have been identified as core capabilities for the agency. Thus, no non-essential facilities are in question. On the other hand, if non-essential infrastructure and activities could be identified, that would be quite important. And so the likelihood would then be very low and the consequences are better than average. |
| **11** | **Political Priorities:** Use of **c**ompeted work may better align with political priorities and policies to outsource and compete.<br><br>What is the current guidance or policy regarding outsourcing and competition?<br><br>Does this effort align with current policy?<br><br>Do other programs and projects sufficiently align so that this aspect is not a factor for this effort? | … this approach will align with current political priorities.<br><br>Same is #5 above. Note that because this is redundant, the scoring will be zeroed out so as not to overly influence the results. |

## Reward Statements and Descriptions (continued)

| | | |
|---|---|---|
| **12** | **External Funding:** Use of competed work may enable and encourage workforce to win non-NASA funds for partially or intermittently funded staff and facilities. | … the NASA workforce will be enabled to win non-NASA funds for intermittently funded staff.<br><br>While it true that competing this work will most likely include a bid from the NASA center and this is good with regards to writing proposals and such, this particular area of expertise would not suffer under the given scenario. In fact, one of the concerns relative to the possibility of NASA doing the work is not having sufficient staff to complete the job. Thus, the likelihood and consequence are both relatively low. |
| **13** | **Project Collaboration:** Use of competed work may encourage collaborations with outside organizations.<br><br>Is collaboration an important element of this effort? | … collaborations with outsdie organizations will be encouraged.<br><br>Because there are two qualified likely bidders outside of NASA for this contract should it be competed and because, in the past, nearly all engine projects have involved collaborative efforts with NASA to some degree, this is very likely. Further, at least one of the potential bidders is comitted to using NASA test facilities. Thus, the likelihood of this is high and the consequences are also fairly high in that such collaborations tend to benefit everyone involved in a long-term sense. |
| **14** | **Support Facilities:** Use of competed work may lead to enhanced competition for external funding and customers to support important NASA facilities.<br><br>What facilities and infrastructure are needed for this effort?<br><br>Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?)<br><br>Are other programs and projects planning to fund these capabilities currently or in the long term? | … this work will lead to the possibility of pursuing other external customers and funding in the future.<br><br>Of particular focus here are the test facilities. Because any test program naturally leads to test facility upgrades in order to replace obsolete systems and to take advantage of the most recent technology advances, this is potentially a significant boost to the long-term viability of these test facilities. One company would use NASA facilities, while the other would not. In the unlikely event that the center won this work, then NASA facilities would be used in that case as well. Thus, the likelihood is better than average and the potential long-term consequences would be quite high. |

### Risk Statements and Descriptions

## RISK STATEMENTS

| # | Recommended Area of Consideration | User Tailored Risk Statements<br>"Given that this project will use competed work; there exists the possibility that…" |
|---|---|---|
| 1 | **Programmatic Risk:** Use of competed work may increase programmatic risk when using "unknown"external capabilities for technically complex work, with less control.<br><br>Have the capabilities of the external organization been properly researched?<br><br>Is past performance known? | …the use of unkown external capabilities could raise the programatic risks.<br><br>Because the two likely commercial bidders are both known commodities, as is the NASA center that would also be bidding, the likelihood of this risk is very small. The consequences, if one assumes the hypothetical, are pretty great considering that rocket engine development is so crucial to the overall success of the exploration initiative (according to the scenario). |
| 2 | **Flexibility and Efficiency:** Use of competed may increase time, effort, cost, and regulatory requirements to initiate work.<br><br>What are the costs associated with initiating the directed work versus competing it?<br><br>How does this impact the life cycle cost? | …there will be associated costs, schedule issues, and regulatory requirements.<br><br>The generation of a Request for Proposals and the conduct of a Source Selection Board take considerable time and money. Considering that this project is crunched for time and that costs in general are tight within the exploration budget, this could be significant. This would be amplified should there be a challenge to the awarding of a contract. Thus, the likelihood is very great and the consequences are severe. |
| 3 | **Workforce Morale:** Use of competed work may create a feeling of insecurity and instability in staff, which can diminish commitment and performance.<br><br>What is the current "morale temperature?"<br><br>Will this business decision have a significant affect on morale? | …a feeling of insecurity and instability will be created within the NASA workforce.<br><br>Because the NASA workforce will have a significant role in this project whether the actual development is done by a contractor or if it is done in house via directed work, this is not a likely issue. Thus, the likelihood is low and the consequences are only average. |
| 4 | **External Collaboration:** Use of competed work may raise conflicts limiting open information exchange with potential competitors.<br><br>What data/information sharing restrictions will apply under directed and competed methods?<br><br>How will these restrictions impact future competitiveness and overall missions success? | … conflicts will arise regarding the open flow of information between NASA and potential competitors.<br><br>For the scenario presented, this is a possibility if the NASA center wins the open competition. However, because this is unlikely and because whatever NASA develops or learns in such a situation will likely be available to those within the industry, the consequences are not great. |
| 5 | **Center Budgeting:** Use of competed work may prevent Centers from planning future budgets as accurately given workforce constraints and uncertain funding.<br><br>Will the decision to direct or compete this work have an impact on Center ability to plan future budgets? | … NASA centers will not be able to accurately plan future budgets.<br><br>Because in this case the center in question has already been chosen as the site for project management and, in such a situation, will provide significant engineering support in an insight role, this funding is considered to be relatively stable. In fact, for this case, because this is not an undertaking normally done in house, competing the work actually reduces the likelihood of erratic or inaccurate funding predictions. Thus, the likelihood is low and the consequences are low. |

## Risk Statements and Descriptions (continued)

| | | |
|---|---|---|
| 6 | **Strategic Research:** Use of competed work may make it difficult to sustain long-term, generational technology and research programs.<br><br>What technologies and research are critical to near-term and long-term mission success?<br><br>How will the business decision impact the ability to sustain needed research and technology? | … long-term, generational technology development and research programs will suffer.<br><br>This particular technology development in general does not fall within the realm of such generational or foundational technology. On the other hand, any such program does indeed result in spin-off higher risk technology research (in materials and analytical tools development for example). This spin off work might be slightly more likely should work be directed versus competed. Thus, likelihood is less than average and the consequences are not great. |
| 7 | **Mission Focus:** Use of competed work may distract the focus of critical personnel from NASA mission.<br><br>Will the necessity to seek out and prepare for competitions (e.g. proposal writing) draw critical personnel away from performing needed work?<br><br>How will this impact mission success and workforce morale? | … the NASA workforce will become distracted from the central mission and focus too greatly on the competition itself.<br><br>This does represent a risk. Even greater than the risk of individual distraction is the risk of institutional distraction. The workforce to support this effort, including the immediate establishment of a project office could be an issue since those working on the proposal and the SEB will have to be segregated from those involved with the project office. Thus, the likelihood is high. The consequences are not small, but neither are they too great since this will be a short-term distraction. |
| 8 | **Center Relations:** Use of competed work may make organizations feel insecure in their roles and funding, and may therefore be less willing to collaborate, or to share competition best-practices.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | … organizations will feel threatened and secretive, thereby shutting the door to potential collaborative efforts.<br><br>As in the case regarding the distraction factor, this is an actual risk, but it too will be limited to the time of the competition. Otherwise, because the more general technology is quite mature, such secretiveness is not generally an issue with regards to dealing with and amongst NASA organizations. Thus, the likelihood is average, but the consequences are limited. |
| 9 | **Critical Infrastructure:** Use of competed work may erode essential facilities and infrastructure.<br><br>What facilities and infrastructure are needed for this effort?<br><br>Will this effort secure the availability of these capabilities as long as they are required for this effort? (i.e. Will this effort fund 100% of the capability?)<br><br>Are other programs and projects planning to fund these capabilities currently or in the long term? | … the support for essential facilities and infrastructure will be eroded.<br><br>In this case, the only identified essential infrastructure are the testing facilities. One of the likely bidders has made clear through the Request for Information process that they would not be utilizing these facilities for various reasons. Thus, the likelihood is average due to the multiple bidders, but the consequences are potentially quite big. |
| 10 | **Core Competencies:** Use of competed work may erode core competencies and essential activities.<br><br>What core competencies are needed for this effort?<br><br>Will this effort secure the availability of the competency as long as it is needed for this effort?<br><br>Are other programs currently funding or planning to fund these competencies? | … the core competencies within NASA will erode.<br><br>For this case, this is not likely. The scenario suggests, in fact, that if this project were undertaken in house in a directed work manner, NASA would have to go outside to pull in additional support. Further, the center has been chosen as the site for the project office and from that responsibility will grow the insight role that will support the core competency within NASA. Thus, the likelihood is very low. The hypothetical consequences on the other hand are indeed quite high. |

## Risk Statements and Descriptions (continued)

| | | |
|---|---|---|
| **11** | **External Collaborations:** Use of competed work may harm collaborations with non-NASA organizations competing for the same funds and work.<br><br>What are the realistic concerns with collaboration and how can these be overcome for this effort?<br><br>Is collaboration an important element of this effort? | … collaborative efforts with outside organizations will be harmed.<br><br>The response is largely the same as #8 above. Note that because this is redundant, the scoring will be zeroed out so as not to overly influence the results. |
| **12** | **Responsiveness:** Use of competed work may hinder focused and rapid response to emergencies and new Agency, National and political priorities.<br><br>Is this effort capable of responding to quick-turnaround actions driven by national or local emergencies (e.g. disasters) or by top-down redirection (e.g. Congressional action)? | … the rapid response to emergencies and new agency policies will be hindered.<br><br>Because a contract will be in place should this work be competed, there will naturally be restrictions as to how maleable this document can be. Thus, if the agency should change direction quickly, the contract might become quickly obsolete and there will be a schedule delay and cost hit for turning this around. On the other hand, because of the particular circumstances of this project and the fact that in a directed work environment NASA would be hard pressed to staff up to the necessary level, in this situation as well rapid response would be difficult. Thus, the fact that this work is competed does not dramatically alter this factor. Likelihood is low and consequences are low. |
| **13** | **Uneven Competition:** Use of competed work may put NASA at a disadvantage, because NASA is required to disseminate its research results, cannot manage staff as flexibly, and is often competing against university employees or students who don't have to seek their full cost.<br><br>What methods or procedures are currently available to "level the competitive playing field" for NASA?<br><br>Can any of these be applied? | … NASA will be at a distinct disadvantage in the competition.<br><br>This is stated as a given fact for this particular scenario. Thus the likelihood is essentially 100%. On the other hand, for the various reasons given above regarding the project office and insight work requirements, the consequences are small. |
| **14** | | …the NASA center could win the competition thereby requiring a number of new, innovative, and unfamiliar programmatic structures.<br><br>Because in the scenario outlined the NASA center is allowed to compete on what is theoretically an equal footing with commercial suppliers, this raises the question as to what would have to be done should NASA win. Would there be a pseudo-contract between the project office and the NASA center? How could such a contract be incentivized or controlled in a standard sense? Thus, these unfamiliarities represent a programmatic risk. Because the NASA center is said to be unlikely to win this competition, the likelihood is low. The consequences are not too high in that something could probably be worked out potentially based upon examples from DOD or other federal agencies. |

## Reward and Risk Scoring

The Reward and Risk scoring process used for this hypothetical case was based strictly on the descriptions provided with the Reward and Risk statements. For actual cases, this process could be far more formalized. The tool provides for the creation of higher fidelity scoring criteria wherein the cost, schedule, and performance aspects of the work can all be quantified to the degree necessary. For the case at hand being used as a demonstration scenario, this additional effort was not undertaken.

Nevertheless, scoring was accomplished for each Reward and Risk. As the score is input, the Red/Yellow/Green overall classification of the Reward or Risk is determined. For Rewards classified as Green, consideration should be given to the creation of plans to ensure that such Rewards are indeed captured. Conversely, for Risks classified as Red, consideration should be given to the creation of risk mitigation plans to ensure that such risks do not come to fruition.

On the next several pages are the Reward and Risk Scoring tables. The Reward and Risk statements are automatically transcribed to these tables by the tool so that the user need only input the corresponding numerical scoring (from one to five).

## Scoring Definitions

An optional step in the Reward and Risk evaluation process is the creation of definitions for the scoring values assigned to each reward and risk. Such a set of definitions can be extremely useful for those cases where costs, schedule, and performance estimates have been already conducted. For the purposes of this exercise, the scores assigned are based more upon intuition and relative merits. Thus, the level of formality with which this tool is used is adaptable to the purposes and circumstances for is usage.

## Reward Scoring Sheet

| | |
|---|---|
| High Reward | |
| Moderate Reward | |
| Low Reward | |

# REWARDS

| # | Reward Statements | Likelihood | Consequences | Color Rating |
|---|---|---|---|---|
| 1 | ...NASA will leverage new and breakthrough technologies for engine development from outside NASA.<br><br>All 3 designs have known potential new technologies, but none of them are truly breakthrough. So competition itself may not be the catalyst for innovation in this case. This, in part, is due to the overall maturity of rocket engine design and the limited number of likely bidders for this work. Thus, the likelihood is very low that competition itself with spur a technology breakthrough. | 1 | 4 | |
| 2 | … the center's workforce willl be energized by the process of competing with commercial engine developers.<br><br>The center will be involved in the engine development process whether the engine work is competed or directed. However, the work will be substantially greater should the center actually have primary development responsibility. A competition would motivate both the NASA workforce and the contractor workforce to strive to win the contract. Likelihood is high, but the consequences are possibly not that long lasting beyond ATP. | 5 | 1 | |
| 3 | … NASA will maximize the use of commercial engine development capabilties.<br><br>Past history has demonstrated that indeed there are commercial entities capable of doing this work. Further, based upon the scenario description, it is likely that if this work is competed that it will go to such a capable contractor. Thus, the likelihood is high. The consequences are likely also high based upon the fact that these capabilities within industry may not otherwise be used and so a long-term capability within the commercial sector may be lost. | 4 | 5 | |

## Reward Scoring Sheet (continued)

| | | | | |
|---|---|---|---|---|
| **4** | … this work will advance private sector capabilities thereby improving the national economy.<br><br>Beyond the fixed likelihood that any work will employ a number of people (regardless of whether it is competed or directed), there is one identified possibility for a technology transfer with broad implications. No such tech transfer is identified for the other cases. Thus likelihood for this reward is moderate and the consquences are potentially higher than moderate. | 3 | 4 | |
| **5** | … this approach will fulfill current policies recommend outsourcing.<br><br>Current policies do indeed support private sector participation when appropriate. The various documents referenced further suggest that this is an appropriate competitive work example. Further, from the scenario description there may be other political reasons for allowing the most likely bidders to compete for this contract. Thus, the likelihood is very high but the consequences are just average. The latter is the case because in a fair and open competition, such political considerations cannot play a part so the mentioned powerful congressman might end up being disappointed. | 5 | 3 | |
| **6** | …the NASA competencies will be validated by suceeding in competition.<br><br>Since project office location has already been selected, a certain level of skill and competency validation has already taken place. Further, it is unlikely that NASA can win this if competed. Thus, likelihood is low and the consequences are also low. | 2 | 2 | |
| **7** | … there will be clearly defined accountability for budget and performance integration.<br><br>If contactor wins this becomes a straightforward contractual envrionment with the appropriate built-in incentives. If NASA wins, additional accountbility and oversight would need to be developed (and this will be a potential risk). Thus, the likelihood is higher than average and the consequences are high based upon the agency need to demonstrate budget accountability. | 3 | 4 | |

## Reward Scoring Sheet (continued)

| | | | | | |
|---|---|---|---|---|---|
| | **8** | … the NASA workforce ability to compete will be enhanced.<br><br>Unquestionably a competition will help NASA improve proposal writing and overall ability to compete based upon this alone, even if the center does not win the competition. The likelihood is high, but the consequnces in this particular area of endeavor is limited since such engine development programs are few and far between. | 4 | 2 | |
| | **9** | … cost effectiveness, particularly with regards to administrative overhead, will be enhanced.<br><br>The likely commercial bidders have in the past showed a willingness to be innovative with regards to finding ways to be cost effective. This can be written into the request for proposals. Further, the independent cost estimate for this project shows that administrative costs will be substantial so this is very important. The likelihood is better than average since it is likely that one of these contractors will win the competition and the consequences are high. | 4 | 4 | |
| | **10** | … non-essential or non-competitive NASA facilities will be identified.<br><br>Test facilities are the only NASA infrastructure items identified. These have been identified as core capabilities for the agency. Thus, no non-essential facilities are in question. On the other hand, if non-essential infrastructure and activities could be identified, that would be quite important. And so the likelihood would then be very low and the consequences are better than average. | 1 | 4 | |
| | **11** | … this approach will align with current political priorities.<br><br>Same is #5 above. Note that because this is redundant, the scoring will be zeroed out so as not to overly influence the results. | 0 | 0 | |

## Reward Scoring Sheet (continued)

| | | | | |
|---|---|---|---|---|
| **12** | … the NASA workforce will be enabled to win non-NASA funds for intermittently funded staff.<br><br>While it true that competing this work will most likely include a bid from the NASA center and this is good with regards to writing proposals and such, this particular area of expertise would not suffer under the given scenario. In fact, one of the concerns relative to the possibility of NASA doing the work is not having sufficient staff to complete the job. Thus, the likelihood and consequence are both relatively low. | 2 | 2 | |
| **13** | … collaborations with outsdie organizations will be encouraged.<br><br>Because there are two qualified likely bidders outside of NASA for this contract should it be competed and because, in the past, nearly all engine projects have involved collaborative efforts with NASA to some degree, this is very likely. Further, at least one of the potential bidders is comitted to using NASA test facilities. Thus, the likelihood of this is high and the consequences are also fairly high in that such collaborations tend to benefit everyone involved in a long-term sense. | 4 | 4 | |
| **14** | … this work will lead to the possibility of pursuing other external customers and funding in the future.<br><br>Of particular focus here are the test facilities. Because any test program naturally leads to test facility upgrades in order to replace obsolete systems and to take advantage of the most recent technology advances, this is potentially a significant boost to the long-term viability of these test facilities. One company would use NASA facilities, while the other would not. In the unlikely event that the center won this work, then NASA facilities would be used in that case as well. Thus, the likelihood is better than average and the potential long-term consequences would be quite high. | 3 | 4 | |

**Risk Scoring Sheet**

Low Risk
Moderate Risk
High Risk

## RISKS

| # | Risk Statements | Likelihood | Consequences | Color Rating |
|---|---|---|---|---|
| 1 | …the use of unkown external capabilities could raise the programatic risks.<br><br>Because the two likely commercial bidders are both known commodities, as is the NASA center that would also be bidding, the likelihood of this risk is very small. The consequences, if one assumes the hypothetical, are pretty great considering that rocket engine development is so crucial to the overall success of the exploration initiative (according to the scenario). | 1 | 4 | |
| 2 | …there will be associated costs, schedule issues, and regulatory requirements.<br><br>The generation of a Request for Proposals and the conduct of a Source Selection Board take considerable time and money. Considering that this project is crunched for time and that costs in general are tight within the exploration budget, this could be significant. This would be amplified should there be a challenge to the awarding of a contract. Thus, the likelihood is very great and the consequences are severe. | 5 | 4 | |
| 3 | …a feeling of insecurity and instability will be created within the NASA workforce.<br><br>Because the NASA workforce will have a significant role in this project whether the actual development is done by a contractor or if it is done in house via directed work, this is not a likely issue. Thus, the likelihood is low and the consequences are only average. | 1 | 3 | |

## Risk Scoring Sheet (continued)

| | | | | |
|---|---|---|---|---|
| **4** | … conflicts will arise regarding the open flow of information between NASA and potential competitors.<br><br>For the scenario presented, this is a possibility if the NASA center wins the open competition. However, because this is unlikely and because whatever NASA develops or learns in such a situation will likely be available to those within the industry, the consequences are not great. | 1 | 3 | |
| **5** | … NASA centers will not be able to accurately plan future budgets.<br><br>Because in this case the center in question has already been chosen as the site for project management and, in such a situation, will provide significant engineering support in an insight role, this funding is considered to be relatively stable. In fact, for this case, because this is not an undertaking normally done in house, competing the work actually reduces the likelihood of erratic or inaccurate funding predictions. Thus, the likelihood is low and the consequences are low. | 1 | 1 | |
| **6** | … long-term, generational technology development and research programs will suffer.<br><br>This particular technology development in general does not fall within the realm of such generational or foundational technology. On the other hand, any such program does indeed result in spin-off higher risk technology research (in materials and analytical tools development for example). This spin off work might be slightly more likely should work be directed versus competed. Thus, likelihood is less than average and the consequences are not great. | 2 | 2 | |
| **7** | … the NASA workforce will become distracted from the central mission and focus too greatly on the competition itself.<br><br>This does represent a risk. Even greater than the risk of individual distraction is the risk of institutional distraction. The workforce to support this effort, including the immediate establishment of a project office could be an issue since those working on the proposal and the SEB will have to be segregated from those involved with the project office. Thus, the likelihood is high. The consequences are not small, but neither are they too great since this will be a short-term distraction. | 4 | 3 | |

## Risk Scoring Sheet (continued)

| | | | | |
|---|---|---|---|---|
| **8** | … organizations will feel threatened and secretive, thereby shutting the door to potential collaborative efforts.<br><br>As in the case regarding the distraction factor, this is an actual risk, but it too will be limited to the time of the competition. Otherwise, because the more general technology is quite mature, such secretiveness is not generally an issue with regards to dealing with and amongst NASA organizations. Thus, the likelihood is average, but the consequences are limited. | 3 | 2 | |
| **9** | … the support for essential facilities and infrastructure will be eroded.<br><br>In this case, the only identified essential infrastructure are the testing facilities. One of the likely bidders has made clear through the Request for Information process that they would not be utilizing these facilities for various reasons. Thus, the likelihood is average due to the multiple bidders, but the consequences are potentially quite big. | 3 | 5 | |
| **10** | … the core competencies within NASA will erode.<br><br>For this case, this is not likely. The scenario suggests, in fact, that if this project were undertaken in house in a directed work manner, NASA would have to go outside to pull in additional support. Further, the center has been chosen as the site for the project office and from that responsibility will grow the insight role that will support the core competency within NASA. Thus, the likelihood is very low. The hypothetical consequences on the other hand are indeed quite high. | 1 | 4 | |
| **11** | … collaborative efforts with outside organizations will be harmed.<br><br>The response is largely the same as #8 above. Note that because this is redundant, the scoring will be zeroed out so as not to overly influence the results. | 0 | 0 | |

## Risk Scoring Sheet (continued)

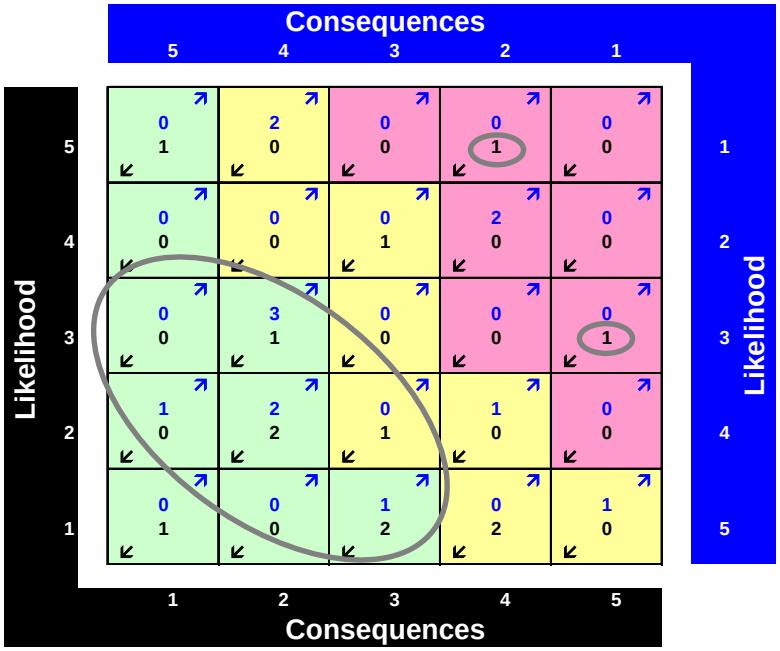
| | | | | | |
|---|---|---|---|---|---|
| | **12** | … the rapid response to emergencies and new agency policies will be hindered.<br><br>Because a contract will be in place should this work be competed, there will naturally be restrictions as to how maleable this document can be. Thus, if the agency should change direction quickly, the contract might become quickly obsolete and there will be a schedule delay and cost hit for turning this around. On the other hand, because of the particular circumstances of this project and the fact that in a directed work environment NASA would be hard pressed to staff up to the necessary level, in this situation as well rapid response would be difficult. Thus, the fact that this work is competed does not dramatically alter this factor. | 2 | 2 | |
| | **13** | … NASA will be at a distinct disadvantage in the competition.<br><br>This is stated as a given fact for this particular scenario. Thus the likelihood is essentially 100%. On the other hand, for the various reasons given above regarding the project office and insight work requirements, the consequences are small. | 5 | 1 | |
| | **14** | …the NASA center could win the competition thereby requiring a number of new, innovative, and unfamiliar programmatic structures.<br><br>Because in the scenario outlined the NASA center is allowed to compete on what is theoretically an equal footing with commercial suppliers, this raises the question as to what would have to be done should NASA win. Would there be a pseudo-contract between the project office and the NASA center? How could such a contract be incentivized or controlled in a standard sense? Thus, these unfamiliarities represent a programmatic risk. Because the NASA center is said to be unlikely to win this competition, the likelihood is low. The consequences are not too high in that | 2 | 3 | |

**Scoring Results: The Reward and Risk Matrix**

Below are the plotted results of the overall process in the form of the Reward and Risk Matrix. In general, the scoring tends to support the notion that this project ought to go forward with the competed work allocation approach. There are a number of identified Rewards as shown within the larger oval in the lower left corner. Further, there are very few high Risks towards the upper right hand corner. However, there are indeed two identified items that do qualify as high risks as shown in the two smaller circles within the red region. Thus, while the Matrix does support the overall notion of competing this work, there do exist two issues to which should be applied some level of risk mitigation activity to ensure success of the overall program.

# R&R Matrix

**REWARDS**



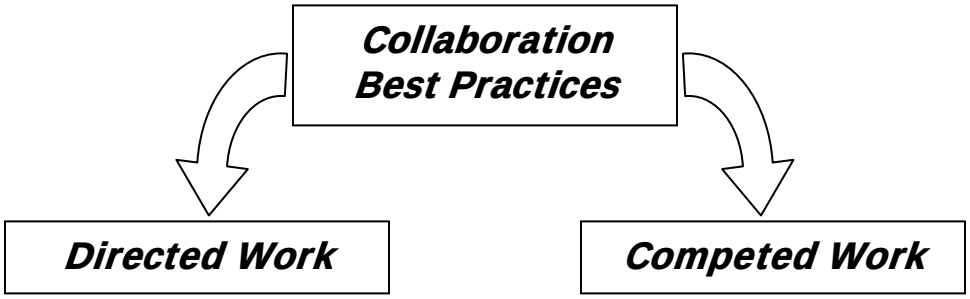

**RISKS**

# Summary Tally

| | High | Medium | Low |
|---|---|---|---|
| **Rewards** | 7 | 4 | 2 |
| **Risks** | 2 | 4 | 7 |

## Appendix C: Collaboration

### Collaboration Activities




#### Executive Summary

In support of the collaboration element of the overall NASA Leadership Development Program (LDP) 2004-05 Class Project, the Collaboration Team undertook two goals: to formulate a handbook describing the principles and best practices of effective collaboration and to collect data to augment the work accomplished by the previous LDP class in identifying these principles and best practices. The ***NASA Collaboration Handbook*** was written based upon the collected and analyzed data and upon independent research in fulfillment of the first goal. Interviews were conducted across the agency and across multiple collaborative efforts in order to collect data and fulfill the second goal.

#### Introduction

NASA's second Leadership Development Program (LDP) class, the class of 2004-05, was instructed to put together a project that would have a significant impact on the Agency. The LDP 2004-05 Class began its project in the midst of NASA's transformation towards using more competitive means to allocate work, as opposed to directing much of this work in the past. In this environment, this year's LDP project took a broad look at what the LDP class perceived as potential issues related to the way NASA does business – namely, competed work versus directed work. Accordingly, the LDP class chose to put much effort into looking at tools or methods by which NASA managers may better understand competitive work versus directed work decisions in the context of NASA's vision and mission.

The previous year's LDP Class (2003-04) had put much effort into understanding the best practices and principles of effective collaboration as a means to enhancing mission success. In reviewing the work of last year's class, it was quickly realized that effective collaboration can enhance mission success regardless of the how work is allocated. If parts of NASA are asked to submit competitive proposals to "win" work, then collaboration (either within NASA or with outside entities) allows for the most technically superior and economically feasible

proposals. If parts of NASA are directed to lead a work effort, then collaborative relationships are needed to complete the work in the most effective manner.

Through a combination of the leadership lessons learned as part of the NASA LDP and the personal experiences of members of the class, it was clear that effective collaboration benefits NASA's mission (regardless of the how NASA chooses to do business). Therefore, in the spirit of One-NASA, the LDP 2004-05 Class decided to build upon work from the first NASA LDP class in determining the best practices that lead to effective collaboration. In particular, this year's LDP class focused its efforts on adding to the existing set of analytical data on collaborative practices, and documenting the best practices of collaboration in a manner that helps NASA program and project managers make effective use of such principles to enhance mission success.

The Collaboration Team goals were as follows:

(a) Develop a ***NASA Collaboration Handbook*** that documents, in a clear and concise manner, the best practices and principles of collaboration using both the data collected as part of last year's LDP class project and the independent research and experiences of this year's LDP class.

(b) Provide statistically relevant data that could be added to NASA's existing set of data used to study collaborative practices (or potentially other characteristics) found in NASA programs or projects.

It was recognized from the initial stages of the project that the focus on collaboration was only part of this LDP class's overall project - unlike the previous LDP class whose project focus was solely collaboration as a means for enhancing mission success. Therefore, the collaboration team anticipated some level of adjustment in what could be achieved during the project timeframe. The goal of producing a ***NASA Collaboration Handbook*** remained constant throughout the year. The other goal of providing additional statistically relevant data to add to the existing dataset from last year proved to be very demanding on the small number of class participants working as part of the Collaboration Team. The data collection techniques that were employed required interviewing the right type and number of project participants, conducting the interviews in a certain manner, and properly recording the data. In a time of critical NASA initiatives such as Return to Flight, scheduling and conducting interviews proved to be a logistical challenge.

However, despite such challenges, the overall goals of the LDP class project related to collaboration remained the same throughout this LDP year. Looking at collaboration as part of this LDP 2004-05 Class Project and producing a collaboration handbook provides NASA program and project managers with another tool in their toolbox – this one helping them understand collaboration principles and best practices that may better help them achieve their goals.

**Approach**

For the LDP 2004-05 Class Project, the Collaboration Team was focused on its goals of providing additional, statistically relevant data and producing a collaboration handbook. As noted above, the ***NASA Collaboration Handbook*** documenting the best practices and principles of collaboration was drafted using both the data collected as part of last year's LDP class project and the independent research and experiences of this year's LDP class.

In the pursuit of statistically relevant data for use by NASA in analyzing the collaboration practices or other characteristics of NASA projects, the Collaboration Team needed to identify projects and people that would provide the valuable data. First, collaboration was defined as two or more participants who worked together on an effort of mutual interest. The team focused on collaborative projects that were efforts where NASA installations partnered with each other or external entities to achieve a common result. This definition did not include specific instances where NASA would simply contract for work.

To effectively build upon the previous LDP study of collaboration, it was critical that the methods of acquiring data remain consistent. Towards that end, this year's LDP Collaboration Team worked with Jordan Consulting Services, the same consulting firm initially employed to assist NASA's LDP 2003-04 Class in the collection of relevant data on collaboration.

To ensure collected data could be analyzed and compared to the existing data, the team used two of the same assessment instruments originally developed with Jordan Consulting Services: a survey completed as an interview between participant and LDP class members and a quantitative questionnaire completed only by the participant. The consultant provided training to the LDP Collaboration Team members on how to conduct interviews and capture the conversations with people involved in the collaborative effort. Interviews were conducted by a team of two people, with one conducting the interview and taking notes, and the other solely responsible for taking notes.

To provide for future analysis of the trends and common themes found in the gathered data, it was critical that the interview tell the story of the collaboration. To facilitate open discussion, interviewees were informed that their participation in the process would be considered confidential and all personal identifying information would be removed from the data by the consultant/analyst so that none of the answers would be traceable to any individual being interviewed. Original interview data will be subsequently destroyed.

The Collaboration Team considered various projects, settling on nine (9) projects which represented collaborations within areas of NASA that were the most unrepresented in the initial data set. For each of the projects, it was critical to get the full story of the collaboration. To do that, individuals had to be interviewed from both sides of the collaboration, and those individuals had to represent various perspectives. Therefore, interviewers focused their efforts on talking to upper managers, middle managers, and hands-on workers from each side of the collaborative effort.

**Results**

(a) NASA Collaboration Handbook

From data gathered by the Leadership Development Program, as well as the independent research and experiences of LDP class participants, best practices and principles of collaboration were identified and documented in the ***NASA Collaboration Handbook***.

The ***NASA Collaboration Handbook*** can be used as a tool by NASA program and project managers to help them effectively manage their programs and projects. Agency training programs such as the NASA Academy of Program and Project Leadership (APPL) and the NASA Engineering Training (NET) can incorporate the collaboration best practices and principles identified into the current training curriculum. Also, the ***NASA Collaboration Handbook*** could be formalized into a NASA Policy Guidance document and made available

on the NASA On-line Directives System (NODIS) as a way to make the best practices and principles identified in the handbook easily available to those wishing to incorporate such practices into programs and projects

(b) Set of data resulting from the interviews of NASA projects.

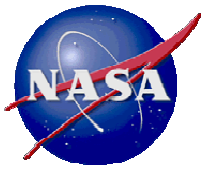
Many interviews were conducted with those involved on both sides of collaborative efforts under NASA projects. The set of data derived from those interviews can and will be analyzed along with the existing dataset currently maintained by NASA's Leadership Development Program. This data can be used to provide valuable insights into the collaborative practices of NASA projects, as well as other characteristics that may be common to effective and successful projects.

The data gathered through the extensive interview process provides NASA management with a valuable set of data that can be used to examine the collaborative practices used in NASA's projects and the effectiveness of those practices. The data may also provide value in looking at other characteristics or practices found in NASA projects. The data on collaboration provided to NASA by the first two LDP classes, and the best practices and principles of collaboration identified in that data, can be incorporated into on-going training and other initiatives within the Agency. Analysis of the data can be used to help program and project managers continually learn about what has proven to be effective in achieving mission success.

**Conclusions**

Through the activities of the Collaboration Team, its two particular allocated goals as a part of the overall LDP 2004-05 Class Project were fulfilled. The ***NASA Collaboration Handbook*** was assembled and it presents in a single document a clear and concise collection of the principles and best practices for effective collaboration. Also significant quantity of data was collected that will bolster even further NASA's understanding of how, when, and why collaborative efforts are successful or unsuccessful.

Looking ahead, continually evaluating and documenting the practices that lead to successful programs and projects is a way for NASA to continue to grow as a learning organization. Engaging in further data collection can only increase the accuracy and effectiveness of the data and how it can be used to identify and teach the best practices of program and project management. Further, updating the ways in which such information is effectively disseminated, such as the maintaining the ***NASA Collaboration Handbook*** or other relevant documentation, can provide the structure that helps ensure NASA's growth as a learning organization.




# NASA Collaboration Handbook: Principles and Best Practices

## Background

Whether working in an environment of competition or directed work, successful collaboration is critical to achieving NASA's mission. This handbook attempts to provide NASA Program and Project Managers with a set of tools and strategies that can enable better collaboration across NASA and support overall mission success.

The best practices and principles contained in this handbook are the result of detailed study and analysis performed by two classes of NASA's Leadership Development Program (LDP). The 2003-2004 LDP Class initiated a study of various collaborative efforts in government and industry as a way of providing NASA Program and Project Managers with common principles that lead to successful collaborations.[1] The 2004-2005 LDP Class took on the responsibility to expand and validate the study by focusing on specific collaborative efforts within NASA that have produced positive results, and consolidate the overall findings into this handbook. The primary method used for both these studies was to conduct and record detailed interviews with managers and staff on both sides of successful collaborations and have the findings validated by an independent consultant for accuracy.

This handbook is intended to be a practical guide that provides the reader with a brief summary of the practices that best supported effective collaborations. This information is shared so that it may be used by NASA Program and Project Managers, and others, to contribute to long-lasting mission success.

## Why Collaborate?

The collaboration study which underlies this handbook showed that collaboration can be effective in improving program or project success, if best practices are employed. And when collaboration is effective, it has many benefits:

- Internal collaborations between NASA Programs, Projects, and Installations can:
  - Increase the resources, knowledge, and talent applied towards achieving NASA's mission, as well as the synergy of complimentary expertise and abilities.
  - Promote the OneNASA concept by establishing trust and understanding among the different parts of NASA
- External collaborations with other Federal agencies, industry, academia, and non-profit organizations can:
  - Leverage the capabilities of other organizations to achieve mission success in the most efficient and cost-effective manner
  - Expand the understanding of the benefits of collaboration, providing opportunities for new and innovative collaborative efforts in a wide array of situations, including open competitions

[1] "Enhancing Mission Success in the 21st Century Through Collaboration", available at http://ldp.nasa.gov

## Goals of this Handbook

The goals of this Handbook are to:

- Support NASA Program and Project managers in developing and executing effective collaborations
- Improve NASA's internal and external collaborations as a means to mission success
- Provide strategies and tools for developing, executing, and fostering effective collaborations
- Highlight best practices for ensuring on-going collaborations are effective

## Principles and Best Practices of Effective Collaboration

After consolidating all the findings from the study, five main principles for developing and executing effective collaborations within NASA were identified:

1. Create a collaborative environment
2. Align needs
3. Develop personal relationships
4. Frame the collaboration
5. Secure management support

These principles are not sequential steps towards collaboration, nor are they a guarantee that collaboration will flourish. However, these are the principles that, at least to some degree, were universally found in the programs and projects that had extremely effective collaborative efforts. The following describes recommendations and best practices for each of these five principles.

## 1. Create a Collaborative Environment

Program and Project Managers are constantly faced with the task of trying to achieve mission success "as only NASA can," but with finite resources. Therefore, it is important that Program and Project managers provide an environment where effective collaboration is recognized and rewarded

***Best Practices:***

- Encourage open communication (especially within NASA). Support the sharing of information about program or project activities and goals to engage others in achieving your goals.
- Encourage creativity within the organization – ask for idea on how to achieve program or project goals and take time to listen.
    - Provide a forum for creative thinking and an avenue for sharing ideas – e.g. dedicated staff meetings, office retreats, or periodic brainstorming sessions.
- Reinforce the need to establish trust – "do what you say".
    - Track ideas and actions to ensure follow-up (i.e., keep an action log).
- Institutionalize Collaboration.
    - Include "teamwork" as part of performance plan and performance reviews, and take it seriously.
- Recognize effective collaboration – through means such as awards and peer recognition.
    - Work with Human Resources to understand all types of awards and recognition available.
    - Dedicate resources to support awards.
    - Publicly recognize collaboration – at staff or project meetings.
    - Schedule presentation time for a collaboration leader.

## 2. Align Needs

Collaboration will succeed when there is a perceived need for collaboration. The needs of all those involved in the collaboration must be addressed to ensure a sustained and valuable collaborative effort.

***Best Practices:***

- Evaluate and document overall goals and objective of your program or project, as well as resource and capability needs, so that you know where collaboration can be a benefit.

- Use a team approach when looking at areas where shared needs exist and needed resources can be exchanged, especially within NASA.

- Don't force collaboration for its own sake. It is a recipe for failure to force collaboration where alignment does not exist. Here is where it is critical to provide a forum for staff at the working level to share ideas on collaborative efforts that may benefit the program or project.

- Closely evaluate the differences in the organizational needs that may or may not be fulfilled by the collaboration, but which may interfere with some aspects of a successful collaboration.

**3. Develop Personal Relationships**

Picking the right people and providing for the development of personal relationships is absolutely critical to enhancing effective collaborations. The opportunity to develop trust and cultivate relationships, face-to-face meeting time must be provided at the initial stages of any collaborative effort.

***Best Practices:***

- Require and provide for face-to-face interactions.
    - Advocate and budget for this time and travel right from the start.

- Promote team-building activities, especially at the initial stages of collaboration.
    - Consider off-site meetings with a facilitator to allow for open discussion and promote individual buy-in to the team approach

- Pick the right people – ensure that they have effective interaction skills.
    - Use past performance, 360-degree assessments, coaching, and training to gauge and enhance skill.

- Consider co-location and/or detail assignments of team members.
    - Work with the Training and Development Office on using Agency supported development programs to further the career of individuals as well as to promote collaboration.

- Provide the tools and technologies to simulate as much as possible face-to-face interaction.
    - Videoconferencing
    - Desktop conferencing (e.g. WebEx)
    - Web-based tools

- Travel funds are a Priority. Budget for travel, and simplify travel authorizations as much as possible.

## 4. Frame the Collaboration

At the initial stage of a collaborative effort, it is important that the goals of the collaboration, and the roles and responsibilities of those involved, be clearly defined and agreed upon.

***Best Practices:***

- At the beginning of a collaborative effort, agree to and document the processes and procedures to be used in the collaboration.
    - In particular, discuss in detail and document the process by which decisions will made that determine the direction of the collaborative effort.
- Provide for an agreed upon dispute resolution process, preferably through initial personal interaction between key people involved in the collaboration.
- As early as possible, identify potential impediments and specific mitigation strategies for the collaborative effort. This should ensure that significant issues are not raised for the first time after much effort has already been invested in the collaboration. For example, early on discuss the following:
    - Financial obligations and resource issues of each party
    - Specific milestone requirements
    - Define who bears the risk of loss due to nonperformance, damage, schedule slip, etc.
- Identify the types and level of risk acceptable to all involved in the collaboration, as well as any process for risk mitigation.
- Ensure that the workload required to support the collaborative effort is appropriately distributed among the collaborating parties.
- Document the Agreement to Collaborate.
    - For internal NASA collaborations, it is critical that the roles and responsibilities of those collaborating be clearly defined. Document the agreement in an operating plan that is signed by the appropriate managers.
    - For collaborations with external organizations, more formal documentation is recommended – i.e. a Space Act Agreement. With external collaborations, it is especially important to clearly and concisely define:
        - responsibilities of each party;
        - any schedule and milestone requirements;
        - key personnel (especially for dispute resolution);
        - dispute resolution process;
        - data rights, invention, or information disclosure issues;
        - financial obligations of each party;
        - handling of potential liabilities and risks;
        - term of the collaboration; and
        - right to terminate the collaboration as needed.
- Seek any institutional support or counsel as early as possible.

## 5. Secure Management Support

In addition to supporting a collaborative environment through recognition, awards, and/or performance planning, Program and Project managers must take an active, on-going role in supporting effective collaborative efforts.

***Best Practices:***

- Monitor the health of the collaboration through periodic reviews (primarily through discussion with the parties involved).
- Ensure and provide for visible senior management support.
- Use a team approach to working the collaborative effort, especially to mitigate the impact of employee turnover.

## Conclusion

This Handbook describes simply and directly the principles and best practices of effective collaboration found in proven, successful programs or projects with collaborative efforts. It is the sincere hope of the LDP classes that contributed to the information in this handbook, that implementation of these principles and best practices by NASA Program and Project managers will enable NASA's Vision for Space Exploration.

## Collaboration Survey Form

Questionnaire returned: yes / no

NOTE: If Questionnaire returned, it will be used for demographic information and only * items required.

*Date: _____

*Name: _____

*Name of collaboration: _____

*Collaboration role/title: _____

Center: _____

Total funding for collaboration: ___

# of people working on collaboration: _

Start Date of collaboration: _____

Scheduled/Actual End date: ___/___

Time you personally have spent in collaboration to this point (months, years, etc.): ____

Typical portion of workweek you personally spend in collaboration (full-time, part-time, percentage, etc.): _____

Brief description of collaboration:_____

_____

1. What technology was used as a tool for communication in this collaboration? (examples: phone, email, virtual teaming, etc.)

2. What kinds of technology would have offered a significant improvement on your ability to communicate and affect the success of the collaboration?

   How would this technology have made the collaboration more likely to succeed?

3. What types of *formal agreements* are recognized and recorded as to who is responsible for various aspects of the collaboration?

   Was this type of agreement effective?

   Would a less formal agreement have been helpful?

4. What types of *informal agreements* are recognized and recorded as to who is responsible for various aspects of the collaboration?

   Was this type of agreement effective?

   Would a more formal agreement have been helpful?

| |
|---|
| 5. What organizational processes inhibited collaboration?<br><br>How did these inhibit collaboration?<br><br>How would you fix these things? |
| 6. What organizational processes enhanced collaboration?<br><br>How did these enhance collaboration? |
| 5. What are the cultural traits of NASA and/or the working groups that inhibited collaboration?<br><br>How did these inhibit collaboration?<br><br>How would you fix these things? |
| 6. What are the cultural traits of NASA and/or the working groups that enhanced collaboration?<br><br>How did these enhance collaboration? |

| |
|---|
| 7. In what ways did the parties involved in this collaboration receive recognition for their work?<br><br>How could recognition of people and teams be improved? |
| 8. What metrics were used to measure the success or failure of this collaboration? |
| 9. How did Senior Management support this collaboration?<br><br>What other kinds of support would have been helpful? |
| 10. What were some of the problems resulting from team dynamics, or the working relationships between different teams in the collaboration? |
| 11. What were some of the assets resulting from team dynamics, or the working relationships between different teams in the collaboration? |
| 12. Were the characteristics and personalities of team leaders and team members taken into consideration and managed at an appropriate level? Please explain. |
| 13. What were some of the problems created by a difference in *organizational culture* between team members? Please explain. |

| |
|---|
| 14. What are the top 2 or 3 elements that have contributed to the collaboration's success? |
| 15. What are the top 2 or 3 elements that have inhibited the success of this collaboration? |
| 16. How was teamwork included in your performance plan? |
| 17. Do you have any thoughts on any mechanisms or cultural issues that are important to make a collaborative effort successful? |
| 18. Is there anything else that you would like to share with us? |

## Collaboration Questionnaire Form

Date: _____

Name: _____

Name of collaboration: _____

Collaboration role/title: _____

Center: _____

Total funding for collaboration: _____

# of people working on collaboration: _____

Start Date of collaboration: _____

Scheduled/Actual End date: _____/___

Time you personally have spent in collaboration to this point (months, years, etc.): ____

Typical portion of workweek you personally spent in collaboration (if part-time, indicate approximate percentage): _____

**Please mark the most appropriate response to the following questions in the space provided.**

**1 = strongly disagree 4 = neither agree nor disagree 7 = strongly agree**

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| I consider this collaboration to be a success, or clearly working towards a successful outcome. | | | | | | | |
| The team members chosen for this collaboration were appropriate for the collaboration and its goals. | | | | | | | |
| There was/is an effective mechanism/metric to measure the success of this collaboration. | | | | | | | |
| The collaboration is being/has been completed on schedule. | | | | | | | |
| Team members were willing to share knowledge. | | | | | | | |
| There was an adequate amount of face to face interaction. | | | | | | | |
| The members of the collaboration team had the same collaboration goals. | | | | | | | |
| Communication was difficult because team members were in different locations, which inhibited collaboration success. | | | | | | | |
| There was a clear and strong team identity. | | | | | | | |
| Funding for this collaboration was equitably and fairly distributed. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Control over the collaboration was equitably distributed between Centers/Partners. | | | | | | | |
| There was adequate recognition of my work and responsibilities in this collaboration from my superior. | | | | | | | |
| This collaboration involved an "us vs. them" attitude. | | | | | | | |
| The rate of staff turnover presented obstacles in this collaboration. | | | | | | | |
| Successes of the team were acknowledged. | | | | | | | |

**Please mark the most appropriate response to the following questions in the space provided.**

**1 = strongly disagree 4 = neither agree nor disagree 7 = strongly agree**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Successes of the team were celebrated. | | | | | | | |
| There was a high level of trust between team members. | | | | | | | |
| The frequency of communication between team members was adequate. | | | | | | | |
| The physical location of various team members were an obstacle in this collaboration. | | | | | | | |
| The schedule for this collaboration was realistic. | | | | | | | |
| Inadequacy of funding strained working relationships. | | | | | | | |
| Scheduling pressures inhibited the team's ability to work well together. | | | | | | | |
| The team had access to necessary expertise. | | | | | | | |
| Unclear team member/partner responsibilities negatively affected working relationships. | | | | | | | |
| Upper management gave this collaboration an adequate amount of support. | | | | | | | |
| Planning for the current collaboration involved input from all relevant parties. | | | | | | | |
| The goals for this collaboration were appropriate and realistic. | | | | | | | |
| The distribution of funding strained working relationships. | | | | | | | |
| The workload was reasonable for this collaboration. | | | | | | | |
| Responsibilities of all team members were clearly defined at the start of the collaboration. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Allocation of accountability was built into the collaboration procedure and applied equitably. | | | | | | | |
| There was adequate administrative support for team members by including collaboration work in performance plans, incentives, etc. | | | | | | | |
| The collaboration is being/has been completed within budget. | | | | | | | |
| There were conflicts between individuals that inhibited the success/progress of this collaboration. | | | | | | | |
| Funding for this collaboration was adequate to meet collaboration goals. | | | | | | | |
| The team members were invested in this collaboration and its outcomes. | | | | | | | |

# Appendix D: Communication

## Communication Activities

### Executive Summary

The NASA Leadership Development Program (LDP) 2004-05 Class Project Communication Team developed a generic plan to effectively communicate a message to the NASA workforce. This plan was applied to the results of the LDP 2004-05 Class Project Business Case, Business Models, and Collaboration Team output, and a resultant project-specific communication plan was produced. The generic and project-specific communication plans, and the approach and processes used to develop them are described.

### Introduction

The Communication Team was established to develop strategies to effectively deliver information resulting from the LDP 2004-05 Class Project to the NASA workforce. The project entitled, "Enabling Effective Collaboration and Competition at NASA", addresses issues of interaction and intersection between directed work, competed work, and collaborative efforts within business models implemented by the NASA Mission Directorates. Of particular concern for the team was the need to initially raise awareness within the NASA workforce about competition and collaboration, the need to sustain that awareness, and the need to ensure a consistent message was communicated via all mechanisms selected. It was also important to ensure that the message and the methodology for communicating it were coordinated with all other stakeholders inside and outside of LDP 2004-05 Class Project.

Because of the concurrent nature of the activities within the overall project, the Communication Team had to define a Generic Communication Plan before the actual results of the project were complete and fully understood. The Communication Team therefore developed this generic plan with the intent to customize it as the project results became clearer.

Customizing the Generic Communication Plan to the results of the LDP 2004-05 Class Project was complicated by the extremely short span of time between the near-finalization of the project results and the need for output communication products. This has resulted in several of the products remaining pending at the time of this writing.

As part of the evolution of the entire project, the products generated in the areas of business models and business case tools changed from the specificity of a singular optimized and universal scheme for doing business within NASA to a series of concepts and tools to enable NASA to more effectively utilize collaboration and competition. Thus, the overall message also had to evolve from a concrete definitive 'Here is how the Agency should do business' to the somewhat softer 'Here are concepts, tools, and processes whereby NASA could do its business better.'

### Approach

The Communication Team considered the following elements of communication to build a strategy that would make a difference: (1) information source, (2) message type, (3)

medium, (4) delivery method, and (5) timing. The information source is defined as the Business Model, Business Case, and Collaboration Teams. The message type is one of direction or "how to". The medium as defined here includes both "push" and "pull" media options. To "push" the message to the workforce, the team elected the use of brochures, posters, presentations, and modifications to the APPL curriculum. To allow the workforce to "pull" the message as needed, the team elected the use of an internet website and hardcopy publications. The delivery methods complement each medium and include face-to-face interaction, displays in common areas, and mail delivery. The timing was the most difficult to determine. The team struggled to decide the best time for the workforce to read, see, or hear the message. The message can be lost if provided too soon or too late or if time is not provided to consume the message itself. It was agreed that the timing be near-term for face-to-face presentations, and that at those briefings "reminder cards" be distributed to provide long-term access to the information.

The Communication Team realized that although all elements of communication can be defined, this did not promise success. The elements build the right model but do not address the dynamics brought to the problem by the audience. The workforce must trust those delivering the message and the methods they use. Credibility is a critical component of communication. Compatibility is also a component that must considered with the audience. The question for consideration is how well the messages "fit" with the culture and expectations of the audience. The messages must be consistent with the "events" of the day.

The Communication Team believed using standard methods of communication within the Agency builds credibility with the listeners. Developing messages from statistically significant data also builds credibility. The LDP 2004-05 Class drew conclusions from data evaluated to determine principles and best practices for collaboration (see ***Enhancing Mission Success in the 21st Century Through Collaborations*** from the LDP 2003-04 Class Project and the ***NASA Collaboration Handbook*** from the LDP 2004-05 Class Project) in addition to best practices for competition (see Competition Principle, OneNASA Competition Working Group). Compatibility was addressed by gathering responses from the LDP 2004-05 Class using a Workforce Concerns Survey. Via this survey, the class discovered the workforce was looking for information to address concerns in the areas of: (a) resource distribution, (b) congressional influence, (c) development and application of NASA center capabilities, competencies, and skills, and (d) communication of Agency strategies, programs, and progress. The policies and implementation models of directed work, competed work, and collaboration certainly play a role in each of the workforce concerns listed. Thus, the work performed within the LDP 2004-05 Class Project is aligned with the "events" of the day (i.e. concerns from the workforce). The Communication Team concluded the messages to be shared with the workforce would thus be of interest and address the question of compatibility. Messages were then developed by the class to be shared with the workforce.

The Communication Team conducted most of their business via teleconference. Teleconferences were held approximately every-other week and were augmented by face-to-face meetings held during each LDP workshop (approximately once per quarter).

The team's initial goals were to develop a list of products and a roll-out strategy for these products. Team members had passion for "sending the right message" and limited experience in the selection and development of a medium or delivery method. The Communications Team augmented their experience base by acquiring, as a team member and primary consultant, Trusilla Steele of the NASA Goddard Space Flight Center Office of Public Relations. Trusilla was a tremendous asset to the team. She provided physical

examples of the mediums we considered and discussed the effectiveness of each from her expert knowledge base. Costs of the items were gathered based upon size, color, format, and production number. Further, Trusilla accepted the lead in the physical creation of our products, working as an interface with the Agency's Office of Strategic Communications. This interface ensured compliance with Agency policies on information distribution.

The LDP workshop conducted in Seattle in early March served as a brainstorming session for both products and strategy. The ideas generated by the Communications Team were consolidated, categorized, and then put to a vote by the entire LDP class (using a technique learned during our Facilitative Leadership class in December). The resultant prioritized list was used as a basis for subsequent evaluation and further development by the team. The criteria included 1) cost to implement, 2) time to develop, 3) initial impact, 4) sustained impact, and 5) target population. Team meetings later continued to explore the reality of meeting production requirements for the physical products, and content requirements for the presentations to be shared in Center face-to-face and OneNASA initiatives.

The team recognized that other initiatives, such as OneNASA, are underway and also have messages to share with the Agency. The Team chose to partner with OneNASA because it provided additional promise of exposure to the workforce. Liaisons were identified within the teams to address synergies and leveraging of resources. The teams agreed on the simple approach of integration, that is, the creation of a presentation, with consistent messages, to be used by all team members. However, the Communication Team remains concerned by the potential for its message to be "lost in the noise" by becoming just one among many messages being delivered to the NASA workforce, especially in this time of transition for the Agency.

**Results**

A Generic Communication Plan and LDP Communication Plan are shown in the Products section of this appendix below.

The Generic Communication Plan establishes a methodology by which any products can be effectively communicated to the NASA workforce. It provides a framework which can be adapted by the Agency to a variety of messages.

The LDP Communication Plan is a customization of the Generic Communication Plan towards the specific goal of communicating the approaches and tools produced by the LDP 2004-05 Class Project to the NASA workforce.

**Conclusions**

An agency-wide communication plan for the results, products, and Findings and Recommendations of the LDP 2004-05 Class Project has been established (Objective 2.1). This plan is based on a more generic communication plan which has applicability to other agency-wide messages. This work has taken into account the diversity of the NASA workforce, including the fact that NASA does not indeed have a single, monolithic culture, but at the very least eleven different sub-cultures representing the ten field centers and Headquarters. Presentations to NASA Management and other elements of the workforce are ongoing or planned (Objectives 2.2 & 2.3). Integration of findings and recommendations into the NASA transformation activities is pending approval by NASA management.

## Generic Communication Plan

- Identify target audience(s) and develop a presentation for each
    - Because of cultural expectations, Presentation(s) are required to build credibility with a NASA audience.
    - Content and Emphasis of presentation(s) vary with target audience.
    - Content of presentation(s) is derived from output products of the project, and meant to distill the message of the project.
    - Presentation(s) serve as content source for other "push" media.
    - Presentation(s) should be somewhat customizable, based on the judgment of the presenter
- Establish a Resource for additional information (i.e., "pull" media)
    - This could be a single reference document, a library of reference material, or a website with multiple products of various types.
- Develop Pre-Presentation advertisements to build interest (e.g., brochures, posters, email announcements)
- Develop Post-Presentation products to serve as reminders (e.g., reference card, plastic bracelet with website)

- Distribute Pre-Presentation advertisements

- Give the Presentation(s) to the Target Audience(s)
    - This should be conducted by personnel with a significant buy-in to the message (e.g., LDP Class members)
    - Solicit feedback on the message, and use it

- Distribute Post-Presentation products

- Partner with other stakeholders (e.g., OneNASA) to ensure continuation of the message
    - Use Presentation subset, and feedback from the Presentation, as a resource
    - Provide them with content which can be used in their communication approach
- Partner with appropriate organizations (e.g., APPL, Headquarters Training) to institutionalize the message through training
    - Use Presentation and resultant feedback, Project output, and LDP expertise as resource

## LDP Communication Plan

- Identify target audience(s) and develop a presentation for each
    - Two key target audiences were identified:
        - NASA Senior Executives at Headquarters and Center Management
        - Mid-level management and other members of the workforce
    - A Briefing for Senior Executives was developed by the Project Integration Team
        - Addresses both the results of the project and the results of the class experience
        - Solicits buy-in and proposes follow-on activities
    - A Briefing for Mid-Level management and others was developed by the Communication Team
        - Emphasizes the results of the project, and explains the value of the proposed approaches and methodologies
        - Contains a significant level of detail about the products developed, which can be omitted at the discretion of the presenter
        - Points to additional information available on the NASA LDP Website
- Establish a Resource for additional information (i.e., "pull" media)
    - The Communication Team decided that the most effective resource would be access to all the products of the 2004-5 Class via the NASA LDP Website
    - The content of this website will evolve as follow-on activities occur
- Develop Pre-Presentation advertisements to build interest (e.g., brochures, posters, email announcements)
    - The Communication Team determined that a "Tri-fold" brochure would be the most appropriate advertisement, augmented by posters at some centers
    - The actual design and production of these products remains as forward work at the time of this publication
- Develop Post-Presentation products to serve as reminders (e.g., reference card, plastic bracelet with website)
    - The Communication Team decided on a reference card with the principles of collaboration and a pointer to the NASA LDP Website
    - The actual design and production of these products remains as forward work at the time of this publication

- Distribute Pre-Presentation advertisements
    - This remains as forward work at the time of this publication.

- Give the Presentation(s) to the Target Audience(s)
    - This remains as forward work for LDP Class members at the time of this publication.
    - With the need for significant follow-on activities, the need to gather and use feedback about the usefulness of the proposed approaches, tools, and products becomes more important.

- Distribute Post-Presentation products
    - This remains as forward work at the time of this publication.

- Partner with other stakeholders (e.g., OneNASA) to ensure the continuation of the message
    - Initially, OneNASA was identified as a stakeholder and discussions about content and products they could used were held
    - The newly established Program Analysis and Evaluation organization (which has taken over responsibility for OneNASA) has also been identified as a stakeholder, and discussions with them are ongoing at the time of this publication.
- Partner with appropriate organizations (e.g., APPL) to institutionalize the message through training
    - The LDP Class has recommended the adoption of the Collaboration Handbook as a NASA Policy document
    - The Communication Team felt that incorporating the proposed approaches, tools, and products within the APPL curriculum was the appropriate course of action to institutionalize our message
    - However, it did not seem appropriate to begin this activity until approaches and tools were improved upon and validated

## Appendix E: Project Plan

# Roadmap to Optimized Competition and Collaboration at NASA

## PROJECT PLAN (Original 12/2004, Updated 3/2005)

## EXECUTIVE SUMMARY

To achieve the Space Exploration Vision, NASA must achieve new levels of efficiency and performance in its technical activities. In particular, NASA must optimize the application and interplay of two powerful but fundamentally different, and potentially opposing, business tools: collaboration and competition. We envision a future where NASA Centers enthusiastically collaborate to achieve greater shared goals, and where NASA targets broad competitions to acquire the best new concepts and capabilities. This project, "Roadmap to Optimized Competition and Collaboration at NASA", represents a major step towards that vision.

The mission of this project is to determine and communicate how NASA can best implement a collaboration-competition business model to optimize mission performance. The approach is to build on recent and current studies of competition and collaboration at NASA, baseline the competition and collaboration approaches of NASA Mission Directorates and similarly benchmark relevant external organizations, develop a business model and supporting business case for optimizing competition and collaboration at NASA, communicate these findings to both NASA senior management and the NASA workforce, and infuse this work into the on-going NASA transformation activity. This project is being undertaken by the NASA Leadership Development Program Class of 2004-2005, a team of enthusiastic leaders with broad NASA experience, the drive to make a lasting difference for NASA, and the commitment to solve issues surrounding competition and collaboration at NASA.

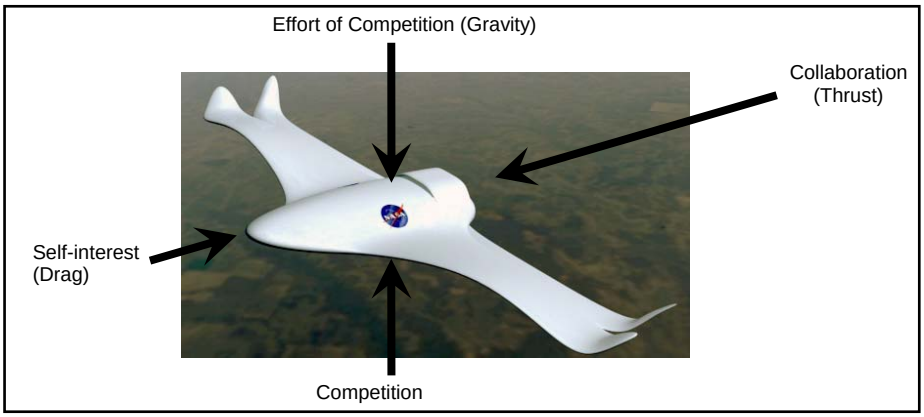



Figure ES-1. Morphing Airplane would dynamically change shape to optimize operation as the forces and mission evolve. Similarly, NASA can optimize competition benefits against effort, to lift missions to new levels of performance, and employ collaboration best practices to enable organizational components to perform optimally together, propelling us towards shared goals.

## INTRODUCTION

The National Aeronautics and Space Administration (NASA) is a multi-faceted organization, composed of four Mission Directorates with different missions, ten field centers spread across the country, and a headquarters facility in Washington, DC. Each Mission Directorate uses a distinct business model to pursue its mission goals. Each field center has its own heritage, mythology, strengths, concerns, and organizational, procedural, and technical styles and methods for fulfilling its service to the Agency. Within this complex organization, NASA has pursued its scientific and engineering missions, sometimes through effective or strained collaboration and sometimes through heated, often embittering, competition. But the application of these potentially powerful business tools has generally been on an ad hoc, program-to-program basis.

Now, however, NASA faces the opportunities and challenges of a unifying Vision for Space Exploration. This task is so daunting that the old ways of pursuing our missions, including the ad hoc, often non-optimal, and sometimes destructive, application of collaboration and competition is no longer acceptable. Instead, NASA must optimize the application and interplay of these two potent but fundamentally different, and potentially opposing, business tools. The goal of this project, Roadmap to Optimized Competition and Collaboration at NASA, is to determine how the agency can best implement a strategic collaboration-competition business model to achieve the Vision for Space Exploration announced by President Bush on January 14, 2004.

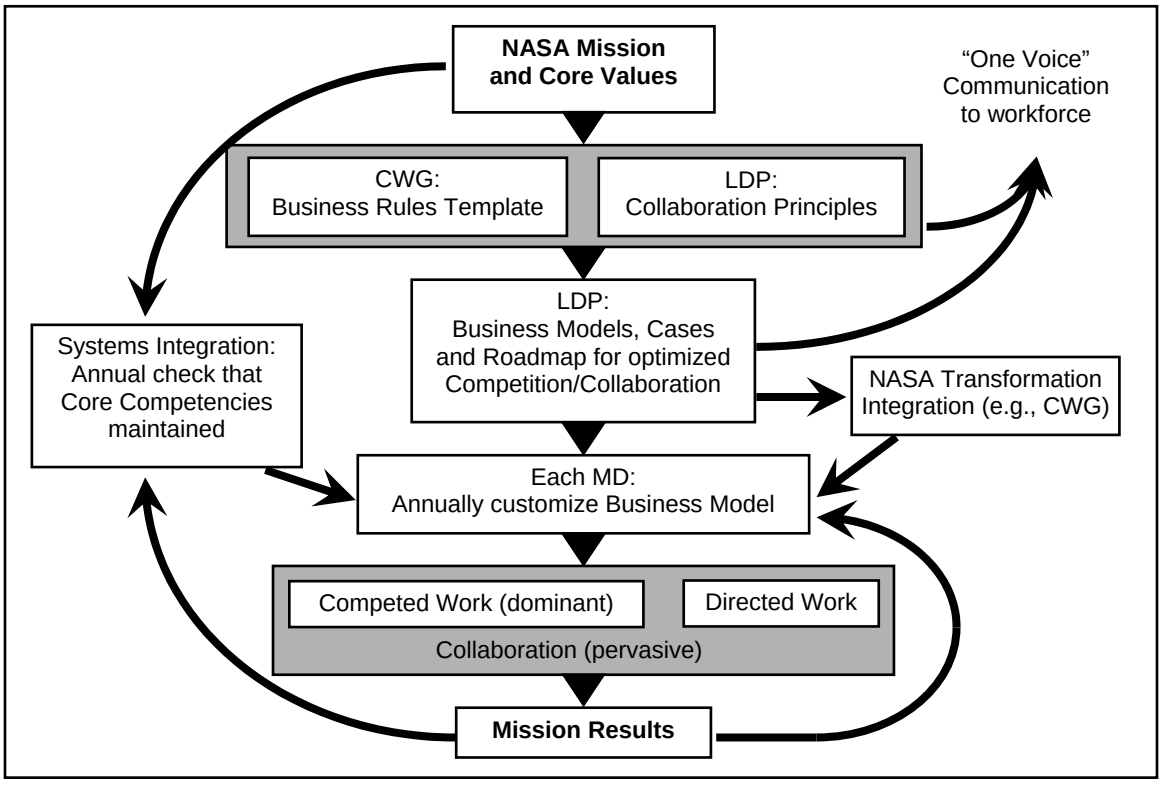
The collaboration model seeks to eliminate duplication of effort and leverage core competencies within the agency. The benefits of effective collaboration can be enormous when all team members are contributing their best. However, in the long term, a collaborative effort unchallenged by external forces can grow complacent, inefficient, and bureaucratic. The competition model, on the other hand, seeks the best performance from all sources within and outside the agency, especially in the development of new concepts and capabilities. Under this model, a certain level of duplication of effort is acceptable, because the optimal approach is not

known at the outset. However, if taken too far, a competitive environment may stifle collaboration if organizations and Centers feel that their domain or survival is threatened.

Thus, both competition and collaboration have inherent benefits and limitations, and there is a natural tension in the interplay of these business tools. The questions remain of when and why competition or collaboration should be used to pursue mission goals, what acquisition strategies and organizational structures provide the most efficient and effective means of implementing those models, and how the agency can leverage and optimize the natural tension between competition and collaboration to achieve the Space Exploration Vision. This project will answer those questions, and thereby show each Mission Directorate how to raise its mission performance to new levels.

Figure 2-1 shows how this project integrates into the larger NASA transformation activity. At the origin is NASA's mission (the Vision for Space Exploration) and Core Values (Safety, Excellence, Integrity, and the NASA Family). From these and a study of the NASA environment, the One NASA Competition Working Group (CWG) derived a set of Competition Principles for NASA, proposing a fair and consistent manner for NASA to use competition to achieve its mission. In the same manner and for the same purpose, the LDP class will derive a set of Collaboration Principles in this project. These principles will guide this project in the development of a Business Model Template and the supporting Business Case for optimizing the use of competition and collaboration at NASA. The LDP class will also provide a draft Business Model customized for each Mission Directorate (MD). The LDP Class will also develop an implementation Roadmap for this Business Model, which will be integrated into NASA's ongoing Transformation.

Annually, each MD would refine their Business Model to reflect their mission needs, and inputs from the Strategic Roadmaps from the Advanced Planning and Integration Office (APIO) and the annual Core Competencies analysis by the Systems Integration Office (SIO). The MDs implement their Business Model, including both competed and directed work. This produces Mission Results, which serve as input to the next Core Competency analysis and MD refinement of their Business Model. Finally, all of these efforts (LDP, CWG, SIO, APIO) need to coordinate to assure that we speak as "One Voice", providing NASA management with important key messages, and providing the workforce with a consistent understanding of how a transformed NASA operates.




The overall approach in this project is to draw from, build on, and integrate several studies of competition and collaboration at NASA, augmenting this with field data gathering, analysis, and communication of results. The project is comprised of five primary tasks, to be completed by mid-July 2005. The Collaboration task will build on the work of the Leadership Development Program (LDP) Class of 2003-2004 to illuminate opportunities, strategies, and best practices for effective collaboration at NASA. The Business Model task will baseline the competition and collaboration practices of the four NASA Mission Directorates, Exploration Systems, Space Operations, Science, and Aeronautics Research, and will benchmark the same in several external organizations. This will yield a flexible business model including a variety of collaborative and competitive acquisition strategies. The Business Case task will perform optimization analysis on this business model, to develop guidelines describing when competition or collaboration is optimal, when and how they should be used in combination, and how to best put these tools into practice through organizational structures and acquisition strategies. The Communication task will develop a strategy to get buy-in for our Business Case from NASA senior management, communicate to the NASA workforce the rationale for NASA's competition and collaboration strategy, and infuse this work into the on-going NASA transformation activity. Finally, the Project Management task includes activities to monitor and integrate the other tasks, to assure that the project meets its milestones and goals.

The products of this project will enable NASA managers to better understand how to leverage both competitive and collaborative environments in a strategic manner to most efficiently and effectively achieve NASA's space exploration goals. These products will discourage the use of extreme or exclusive business models and will enable NASA management to communicate to the

agency as a whole why a particular business model is advantageous in a given case. Finally, these products will help NASA employees to better understand their roles within these business models, decreasing their anxiety from feeling that they have no defined role.

This project is being undertaken by the NASA Leadership Development Program Class of 2004-2005, a team of enthusiastic leaders with broad NASA experience, the drive to make a lasting difference for NASA, and the commitment to solve issues surrounding competition and collaboration at NASA. The team's commitment comes in part from the LDP mission – to develop effective leaders who align with NASA's mission, values and vision of the future, and who are dedicated to creating measurable results that matter to the American people. Because this issue involves getting buy-in from both senior management and the workforce, this team, composed of mid-level leaders from headquarters and all field centers save one, feels uniquely positioned to achieve the goals of this project. Our commitment also derives from our belief that success in this project will help NASA achieve the Vision for Space Exploration.

## GOALS AND OBJECTIVES

The goals and objectives of this project are listed in Table 2-1. All objectives below have a completion date of July 31, 2005, which is the completion date of the project.

## CUSTOMER DEFINITION AND ADVOCACY

The ultimate customer of this project is NASA. We intend that the results of this project be used by and benefit the entire Agency. The direct customers of this project are our NASA sponsors, Mary Kicza (Associate Deputy Administrator for Systems Integration), Jim Jennings (Associate Deputy Administrator for Institutions and Asset Management), and Admiral Craig Steidle (Associate Administrator for Exploration Systems Mission Directorate). We will ensure customer advocacy first by coordinating our activities and goals to integrate with related Agency-level activities (see Section 14), including those of our sponsors. Alignment will be accomplished by initial sponsorship briefings, by seeking review and approval of key components of our project plan from our sponsors, and through on-going (approximately monthly) status and feedback briefings with our sponsors.

Table 2-1. Goals and Objectives

| Goal # | Goal | Obj # | Objective | Validation |
|---|---|---|---|---|
| 1 | Develop Business Models and supporting Business Cases that optimize NASA Mission Directorate use of collaboration and competition. | 1.1 | Produce NASA Collaboration Handbook that defines Collaboration Principles and describes Best Practices. | Sponsor approval |
| | | 1.2 | Develop unified Business Model Template to reflect NASA principles of collaboration and competition, and address when, why, and how regarding collaboration, competition, directed funding, and core competencies. | Sponsor approval |
| | | 1.3 | Develop Business Case that provides a detailed ROI analysis process for developing an optimized MD competition/collaboration Business Model. | Sponsor approval |
| | | 1.4 | Develop draft competition/collaboration Business Model for each MD that accommodates MD uniqueness. | MD leadership acceptance |
| 2 | Initiate a culture change through communication to help NASA understand the benefits and limitations of collaboration and competition. | 2.1 | Develop NASA-wide roll-out plan and infusion roadmap. | Sponsor approval |
| | | 2.2 | Present results to NASA management (minimum: Operations Council, APIO, and MD Leadership). | Inspection |
| | | 2.3 | Present One NASA collaboration/competition messages to at least one audience at each Center, with generally favorable response. | Class close-out survey |
| | | 2.4 | Integrate findings and recommendations into NASA Transformation activity (e.g., One NASA). | Ops Council approval |
| 3 | Project will provide a significant leadership development experience to 2004-5 LDP Class. | 3.1 | Ensure that at least 33% of class has taken on a task or project leadership role for project. | Inspection |
| | | 3.2 | Ensure that at least 50% of class has made an oral presentation for project to a project sponsor. | Inspection |
| | | 3.3 | Ensure that at least 75% of class feels they have met this goal. | Class close-out survey |

## PROJECT AUTHORITY

Authority for this project derives from two sources: the sponsors (see Section 3) and the Program Manager. Through their advocacy, our sponsors increase our authority to engage NASA personnel in the execution of this project, and their approval will enable us to integrate our results into on-going NASA transformation initiatives, so that this work can significantly benefit NASA far into the future. The Program Manager, Chris Williams at NASA HQ, also gives us authority and support to conduct this project. As Director of the NASA Leadership Development Program (LDP), Ms. Williams sets overall direction for the LDP class, and determines its core content. A key component of the LDP program is conducting a class project. This document describes the project of he 2004-5 LDP class.

## MANAGEMENT

The management structure for this project is shown in Figure 5-1. The project executive sponsors and the Program Manager provide high-level direction to the project through interactions with the project manager and any team members the project manager calls upon. The project manager is responsible for assuring that the project is properly planned, that each task is performing according to its plan, and that the tasks are coordinated and integrated as necessary. The Project Manager is supported by an Integration Team, composed of the Task Leads or their designees. Each Task is managed by a Task Lead, who is responsible for organizing and managing the work of the task team. Each task team is composed of 4 to 12 LDP class members. To distribute the

workload and provide many opportunities for leadership, at each LDP workshop (12/6-10/04, 2/28/05 – 3/4/05, and 4/25-29/05), the class will select a new Project Manager and Task Leads. One or more project tasks will be conducted by external consultants. These contracts will be arranged and overseen by the LDP Director.

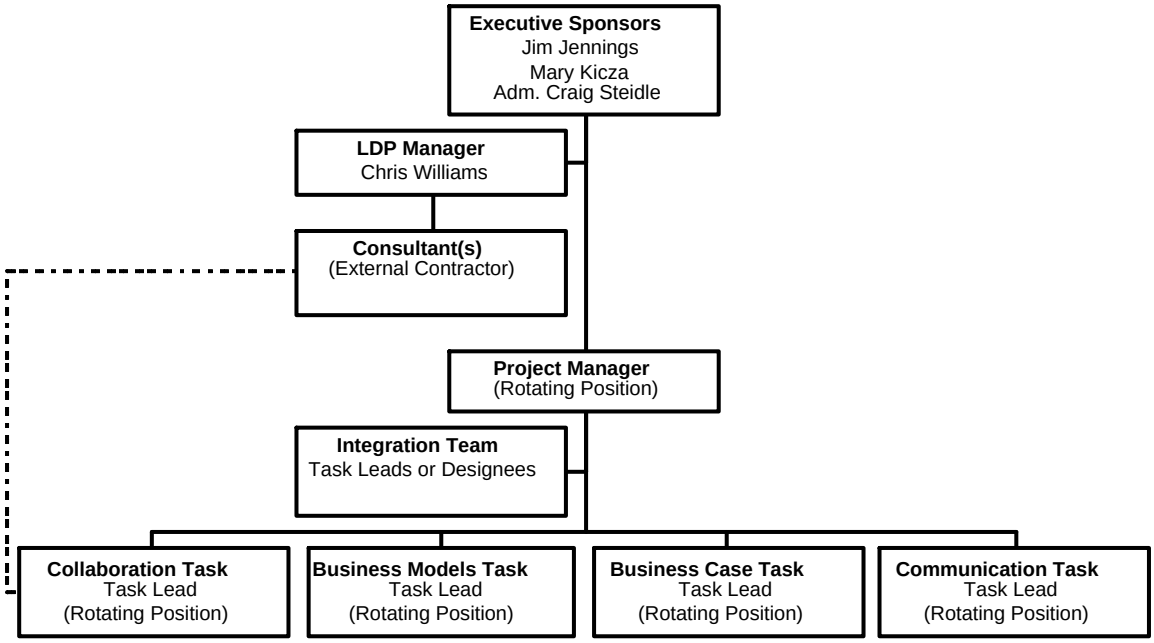



Figure 5-1. Project Management Structure

## PROJECT REQUIREMENTS

This project is the undertaking of the NASA Leadership Development Program (LDP) 2004-2005 Class and therefore is required to support the mission of the LDP – to develop effective leaders who align with NASA's mission, values and vision of the future, and who are dedicated to creating measurable results that matter to the American people. This mission is encapsulated in a leadership model known within the LDP as "The Triangle." Under this model, there are three levels of impact: Personal, Organizational, and Societal. Impact is achieved through a three-step process of Alignment, Results, and Action. It is from these impact levels and this process that the top-level project requirements flow, as shown in Table 6-1.

Note that the requirements for this project are not allocated to specific tasks within the project, since the requirements are met either in *each* task or in the *integration* of task work at the project level. Also, because Goal 2 of this project is to initiate a culture change to move NASA to higher levels of performance, the project's ultimate impact on the Agency and society may take decades to assess. However, Requirements 2 and 3 (organizational and societal impact) are given performance requirements that are verifiable at the end of the project.

Table 6-1. Project Requirements

| Req # | Requirement | "Triangle" Rationale | PR # | Performance Requirements | Verification Method |
|---|---|---|---|---|---|
| 1 | Project team shall acquire significant new leadership experience. | Leaders achieve a positive personal impact | 1.1 | At least 33% of class has been a task or project lead. | Inspection |
| | | | 1.2 | At least 50% of class has made an oral presentation for project to a project sponsor. | Inspection |
| | | | 1.3 | At least 75% of class feels they have met this requirement. | Class close-out survey |
| 2 | Project shall infuse into NASA Transformation to create sustained culture change towards optimized competition and collaboration. | Leaders have a positive organizational impact | 2.1 | NASA Collaboration Handbook that defines Collaboration Principles and describes Best Practices. | Sponsor approval |
| | | | 2.2 | Unified Business Model Template reflects NASA principles of collaboration and competition, and addresses when, why, and how regarding collaboration, competition, directed funding, and core competencies. | Sponsor approval |
| | | | 2.3 | Business Case provides detailed ROI analysis process for developing an optimized MD competition/collaboration Business Model. | Sponsor approval |
| | | | 2.4 | Draft competition/collaboration Business Model for each MD accommodates MD uniqueness. | MD Mgt acceptance |
| | | | 2.5 | NASA-wide roll-out plan and infusion roadmap developed. | Sponsor approval |
| | | | 2.6 | Results presented to NASA management (minimum: Operations Council, APIO, and MD Leadership). | Inspection |
| | | | 2.7 | One NASA collaboration/competition messages presented to at least one audience at each Center, with generally favorable response. | Class close-out survey |
| | | | 2.8 | Findings and recommendations integrated into NASA Transformation activity (e.g., One NASA). | Ops Council approval |
| 3 | Project shall enhance the benefits that NASA brings to the Nation. | Leaders have a positive societal impact | 3.1 | Initiate a culture change at NASA, which serves the public good through aiding ultimate fulfillment of the Vision for Space Exploration and through other measures such as furthering U.S. scientific, security, and economic interests, and acting responsibly with taxpayer resources. | Inspection: completion of Req. 2 |
| 4 | Project plan shall reflect consensus of full project team's understanding of personal, organizational, and societal values. | Leaders align with personal, organizational, and societal values | 4.1 | At every major decision point, project team will hear all opinions, make decisions by consensus, and align behind consensus. | Class close-out survey |
| | | | 4.2 | Project leverages results of related activities at NASA (minimum: 2003-4 LDP project, One NASA CWG, Core Competencies planning). | Sponsor approval |
| | | | 4.3 | Findings and recommendations integrated into NASA Transformation activity (e.g., One NASA). | Ops Council approval |
| 5 | Project shall be scoped, planned, executed, and controlled to achieve all objectives by 5/31/05. | Leaders produce specific, measurable, and valuable results | 5.1 | All project objectives are achieved by July 31, 2005. | Sponsor approval |
| 6 | Project shall engage NASA senior executives sponsors to focus project on specific, achievable, high-impact results. | Leaders enroll key sponsors and an enthusiastic team in their initiatives | 6.1 | Key project plan elements (Objectives, Requirements, deliverables) approved by sponsors. | Inspection |
| | | | 6.2 | At least 4 project briefings will be held with sponsors, to explain project status and recieve feedback and guidance. | Inspection |

## TECHNICAL SUMMARY

The overall approach in this project is to draw from, build on, and integrate several studies of competition and collaboration at NASA, augmenting this with field data gathering, analysis, and communication of results. The project is comprised of five primary tasks: Project Management, Collaboration, Business Models, Business Case, and Communication. These tasks are described below. The project will be completed by July 31, 2005 by the 2004-2005 NASA LDP Class.

The Work Breakdown Structure (WBS) for this project is given in Section 12 (Implementation Approach). This project can also be divided temporally into three overlapping phases:

- Phase I, Task 1.1 (10/4/04 – 1/31/05): Project formulation – Identify, scope, and plan the project, ending with sponsor approval of the project plan.

- Phase II, Tasks 2, 3, 4, 5.1-5.3 (12/13/04 – 5/8/05): Product development – Complete the primary development work of the project, including extension of the previous collaboration work, development of a business model and business case for optimized competition and collaboration at NASA, and development of a NASA-wide roll-out plan.

- Phase III: Tasks 1.4, 5.4 (4/25/05 – 7/31/05): Product roll-out – The products of this project communicated to the executive sponsors, other NASA senior managers, and the NASA workforce, and the on-going NASA transformation activity.

The entire class will participate in each of the three phases, rather than supporting a single task. The following paragraphs describe the 5 top-level tasks of this project.

**WBS 1.0, Project Management:** This task includes the Phase I activities to define the project, including selecting the project concept, engaging executive sponsors, surveying and summarizing prior studies on competition and collaboration, and developing this project plan. These activities dominate the first three months of the project, and the entire LDP class will participate. When Phase II (product development) of the project begins, the Project Management task focuses on monitoring project progress and resolving problems, coordinating and integrating activities, and providing project updates to the project sponsors. Finally, during Phase III (product roll-out), this task is responsible for getting approval of the final products and communicating project results and conclusions to other Agency senior executives. Throughout the project, communication with NASA senior leadership will be managed and accomplished as part of this task.

**WBS 2.0, Collaboration:** The Collaboration task will build on the work of the Leadership Development Program (LDP) Class of 2003-2004 to illuminate opportunities, strategies, and best practices for effective collaboration at NASA. The goal of the task is to further catalog collaboration principles and document those best practices in a collaboration handbook. From the results presented by the previous LDP class, NASA management requested additional insight into projects at specific centers as well as specific programs, such as ISS and Shuttle. The projects selected by this class will fulfill that request and provide complementary data for

analysis. The results will be documented in a collaboration handbook that will be available to NASA employees as well as integrated into existing NASA training courses.

**WBS 3.0, Business Models:** The Business Model task will baseline the competition and collaboration practices and structures of the four NASA Mission Directorates, and will benchmark similar practices and structures in several external organizations. This work will yield a series of consistently defined, descriptive, and graphical business models including a variety of collaborative and competitive acquisition and implementation strategies. The goal will be to generate models of sufficient detail and breadth to support the development of hypothetical optimized competition and collaboration business models applicable to future NASA exploration programs. Further work performed in parallel and in coordination with the optimization efforts of WBS 4.0 element, Business Case, will be to apply systems modeling concepts and tools to the various developed business models. This effort will foster a deeper, communicable understanding of the impacts and interactions of different strategic decisions and formulations.

**WBS 4.0, Business Case:** The Business Case task will include assessments of the Business Model (and any alternative models) to describe the justification and return on investment (ROI) for implementation. The goal of this task is to provide compelling justification for implementing an optimal utilization of both competition and collaboration at NASA. Activities will include 1) a situational assessment capturing the historic, current and future issues related to NASA's operational performance, stakeholders, and employees; 2) a description of the desired end-state for the Competition/Collaboration effort, including changes to NASA's organization (people, culture, training, etc.), processes, and support systems; 3) a description of the Business Model under consideration, including a discussion about the implications to the organization if the Competition/Collaboration project is not implemented (the do-nothing scenario); 4) an estimate of every anticipated cost associated with implementing the Business Model. This should include both financial costs as well as impacts to NASA's organization, processes, and people due to the implementation; 5) Benefits, both qualitative and quantitative, that will result from implementation, including cost reductions, productivity increases, improved technical performance, improved employee morale, lower turnover, etc.; 6) a roadmap and timeline for implementation; 7) a discussion of critical assumptions and risk assessments; 8) a strengths, weaknesses, opportunities, and threats (SWOT) analysis for implementing the Business Model; and 9) conclusions and recommendations identifying the optimal Competition/Collaboration Business Model and a supporting ROI analysis The business case task will be performed as part of Phase II of the LDP Project.

**WBS 5.0, Communication:** The Communication task will develop a strategy to support NASA senior management in providing a clear message, inside and outside NASA, to communicates how NASA is operating today and how NASA plans to operate tomorrow. The message must address the roles of competition, collaboration, and directed funding in the NASA business model. The message will be most effective when a member of the NASA team can answer the question, "Where do I and my work fit into this model?" The outcomes expected from this task address intrinsic emotional attributes of the NASA workforce: morale, trust, credibility, and ownership. The Communication task will identify the barriers that currently restrict open communication on this subject within NASA. The task will develop a strategy to, in all earnest,

eliminate those barriers. Communication includes elements of education, understanding, and feedback. The strategy developed within this task will include tools to: (1) educate our workforce on the process and benefits of the business model, (2) promote understanding of their role in the process and the opportunities that the model includes, and (3) stimulate feedback and sustain openness on this subject, allowing the model to evolve as NASA continues to transform.

Table 7-1 lists the key deliverables of the project. The Project Manager is responsible for ensuring delivery or completion of these deliverables. The project's Executive Sponsors must certify their acceptance of the deliverables by the due date.

Table 7-1. Project Deliverables

| Del # | Deliverable Description | Due Date |
|---|---|---|
| 1 | Draft Report: Roadmap to Optimizing Competition and Collaboration at NASA, including Business Models, Business Cases, Roll-Out Plan. | 6/3/2005 |
| 2 | Briefings: Project results and supporting materials presented to NASA senior management and an audience at each NASA Center. | 7/1/2005 |
| 3 | Final Report: Roadmap to Optimizing Competition and Collaboration at NASA, including Business Models, Business Cases, Roll-Out Plan. | 7/31/2005 |

## LOGISTICS

A collaboration website will be maintained at https://secureworkgroups.grc.nasa.gov/ to support the project, primarily for communication and document storage. Each LDP participant will be able to upload and download documents and use other website features. The Class will also have a 'Meet Me' teleconferencing communication tool for distributed meetings. A contractor consultant will be employed as part of the Collaboration task, to analyze interview data. The consultant will also train LDP interviewees in required procedures and behaviors for interviews.

## SCHEDULES

This project began on October 4, 2004, and will be completed by July 31, 2005. The high-level schedule for this project is shown in Table 9-1. Project milestones are listed in Table 9-2.

Table 9-1. High-Level Project Schedule

| WBS | Task Title | Start Date | End Date |
|---|---|---|---|
| | | | |
| | **Project Milesones** | | |
| | **LDP Workshops** | | |
| **1** | **Project Management** | **10/04/04** | **07/31/05** |
| 1.1 | Identify, Scope, and Plan Projec | 10/04/04 | 02/06/05 |
| 1.2 | Monitor Project, Resolve Proble | 10/04/04 | 07/17/05 |
| 1.3 | Integrate Activities and Results | 10/04/04 | 07/17/05 |
| 1.4 | Communicate with Sponsors/M | 10/04/04 | 07/31/05 |
| **2** | **Collaboration (from 2003-4 LDP** | **10/04/04** | **05/15/05** |
| 2.1 | Engage Contractor; Train Class | 10/04/04 | 12/12/04 |
| 2.2 | Augment Collaboration Databas | 12/13/04 | 05/15/05 |
| 2.3 | Develop Collaboration Handbook | 12/13/04 | 05/15/05 |
| **3** | **Business Models** | **12/13/04** | **05/08/05** |
| 3.1 | Establish MD Baseline Models | 12/13/04 | 02/10/05 |
| 3.2 | Benchmark Outside Bus. Mode | 02/07/05 | 04/01/05 |
| 3.3 | Optimize Business Model | 02/11/05 | 05/08/05 |
| **4** | **Business Case (BC)** | **12/13/05** | **05/08/05** |
| 4.1 | Review Existing Business Case | 12/13/04 | 01/31/05 |
| 4.2 | Develop Business Case Templa | 01/17/05 | 03/11/05 |
| 4.3 | Develop Business Case | 02/07/05 | 05/08/05 |
| **5** | **Communication** | **12/13/05** | **07/17/05** |
| 5.1 | Document Workforce Concerns | 12/13/04 | 03/04/05 |
| 5.2 | Develop Strategy for Agency Su | 02/14/05 | 04/24/05 |
| 5.3 | Develop Workforce Roll-Out Pla | 12/13/04 | 03/04/05 |
| 5.4 | Roll-out to Workforce | 04/25/05 | 07/17/05 |

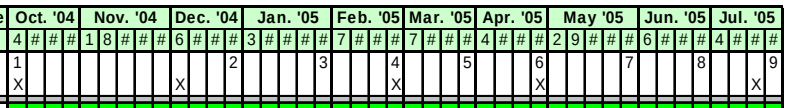



Table 9-2. Project Milestones

| MS # | Milestone Description | Due Date |
|---|---|---|
| 1 | Project concept selected and defined | 10/07/04 |
| 2 | Project Executive Sponsors briefed and engaged | 12/31/04 |
| 3 | Project Plan approved by Executive Sponsors | 03/04/05 |
| 4 | Status briefing to Executive Sponsors | 03/04/05 |
| 5 | Status briefing to Executive Sponsors | 04/01/05 |
| 6 | Status briefing to Executive Sponsors | 04/29/05 |
| 7 | Draft report approved by Executive Sponsors | 06/03/05 |
| 8 | Briefing to NASA senior management complete | 07/01/05 |
| 9 | Final report approved by Executive Sponsors | 07/31/05 |

## RESOURCES

LDP participants are supported by their home Center during their LDP assignment. Travel to LDP events (e.g., workshops) is funded by the LDP. Since this project is part of the LDP assignment, LDP participant salary costs are already paid, and are therefore not included here. The costs attributable to this project are shown in Table 10-1. These costs include consultant fees, travel, software purchase, and incidentals, all of which will be paid for by the LDP.

Table 10-1. Project Funding Requirements

| WBS # | Task Title | Expense | Funding ($K) | | | |
|---|---|---|---|---|---|---|
| | | | Q4-04 | Q1-05 | Q2-05 | Total |
| 1.2 | Monitor Project; Resolve Problems | Microsoft Project Software | 0 | 0.5 | 0 | 0.5 |
| 2.2 | Augment Collaboration Database | Consultant | 0 | TBD | 0 | 0 |
| 3.2 | Benchmark Outside Bus. Models | LDP Member Travel | 0 | 3 | 0 | 3 |
| 3.3 | Optimize Business Model | Systems Modeling Software | 0 | 1 | 0 | 1 |
| 5.3 | Develop Workforce Roll-Out Plan | Marketing Consultant | 0 | TBD | 0 | 0 |
| 5.4 | Roll Out to Workforce | Publication Materials | 0 | 0 | TBD | 0 |
| | **Project Total** | | **0** | **4.5** | **0** | **4.5** |

## CONTROLS

Table 11-1 summarizes the items that are controlled in the planning and execution of this project, who exercises control, and who should be notified in the event of a change in an item.

Table 11-1. Summary of Controlled Items.

| Item # | Controlled Item | Approved by... | Notify... |
|---|---|---|---|
| 1 | Objectives (Section 2) | Sponsors | Program Manager |
| 2 | Requirements (Section 6) | Sponsors | Program Manager |
| 3 | Deliverables (Table 7-1) | Sponsors | Program Manager |
| 4 | Project plan (this document) | Program Manager | Sponsors |
| 5 | Start/end dates (Section 9) | Program Manager | Sponsors |
| 6 | Milestones (Table 9-2) | Program Manager | Sponsors |
| 7 | Budget (Table 10-1) | Program Manager | Sponsors |
| 8 | Management structure (Section 5) | Project Manager | Program Manager |

## IMPLEMENTATION APPROACH

This project evolves from an initial set of distinct tasks to a set of highly integrated, interactive, and iterative tasks. For example, the Business Models and Business Case tasks start with a period of separate data gathering, followed by loose integration starting around 1/31/05, ending in May with a single integrated team sharing all meetings and results. Similarly, the Communication task engages in increasingly frequent dialog with all other tasks as the roll-out plan is developed. During the last two months of the project, the entire LDP class becomes involved in the Communication task as part of implementing the roll-out plan.

This project will seek reviews from our sponsors on a roughly monthly basis, as indicated by the X's in Task 1.4 of Figure 9-1. These will serve as regular project reviews. During the week of May 23, 2005, we will seek a "Go/No-Go" decision from our executive sponsors, to get approval for an Agency roll-out. Each task lead will maintain a lower-level schedule for their task, and will update the Project Manager regarding any changes to the high-level schedule as soon as those changes are known. A contractor will be engaged in Task 2.2 for the entire month of March 2005 to analyze and summarize the collaboration interview data.

The project WBS (Work Breakdown Structure) is shown in Table 12-1. All tasks will be completed by the LDP project team, except where noted (WBS elements 2.2.4, 5.1.4, 5.3.2).

Table 12-1a. Project Work Breakdown Structure (WBS 1-2)

| WBS # | Activity/Deliverable/Milestone Description | Start Date | End Date |
|---|---|---|---|
| **1** | **Project Management** | **10/04/04** | **07/31/05** |
| 1.1 | Identify, Scope, and Plan Project | 10/04/04 | 01/31/05 |
| 1.1.1 | Engage Executive Sponsors (Kicza, Jennings, Steidle) | 10/04/04 | 01/09/05 |
| 1.1.2 | Integrate Related Prior Work on Competition and Collaboration | 10/04/04 | 12/10/04 |
| 1.1.3 | Develop Approach to Include Communication and Credibility Project Ideas | 10/04/04 | 10/31/04 |
| 1.1.4 | Develop Project Plan | 10/04/04 | 01/31/05 |
| 1.2 | Monitor Project and Resolve Problems | 10/04/04 | 07/17/05 |
| 1.3 | Integrate Project Activities and Results | 10/04/04 | 07/17/05 |
| 1.4 | Communicate with Sponsors and Management | 10/04/04 | 07/31/05 |
| 1.4.1 | Prepare and give status briefing #1 to Executive Sponsors | 01/31/05 | 03/04/05 |
| 1.4.2 | Prepare and give status briefing #2 to Executive Sponsors | 03/05/05 | 04/01/05 |
| 1.4.3 | Prepare and give status briefing #3 to Executive Sponsors | 04/02/05 | 04/29/05 |
| 1.4.4 | Develop draft report and get Executive Sponsor approval | 04/30/05 | 06/03/05 |
| 1.4.5 | Complete briefings to NASA senior management | 06/04/05 | 07/01/05 |
| 1.4.6 | Prepare final report and get Executive Sponsor approval | 06/04/05 | 07/31/05 |
| **2** | **Collaboration** | **10/04/04** | **05/15/05** |
| 2.1 | Engage Contractor; Train Class | 10/04/04 | 12/12/04 |
| 2.2 | Augment Collaboration Database | 12/13/04 | 05/15/05 |
| 2.2.1 | Identify 12 Projects (e.g., Shuttle, JWST) and POCs for interviews | 12/13/04 | 12/19/04 |
| 2.2.2 | Distribute materials/guidance to interviewers | 12/13/04 | 12/19/04 |
| 2.2.3 | Complete interviews and database entry | 12/20/04 | 03/18/05 |
| 2.2.4 | Analyze interview data; Report new findings to class | 03/21/05 | 05/15/05 |
| 2.3 | Develop Collaboration Handbook | 12/13/04 | 05/15/05 |
| 2.3.1 | Comment on Draft 0.1 | 12/13/04 | 12/19/04 |
| 2.3.2 | Complete Draft 0.2 | 12/20/04 | 02/25/05 |
| 2.3.3 | Stylize and polish Handbook (v. 1.0) | 02/28/05 | 04/15/05 |
| 2.3.4 | Update with Survey findings | 04/18/05 | 05/15/05 |

Table 12-1b. Project Work Breakdown Structure (WBS 3-5)

| WBS # | Activity/Deliverable/Milestone Description | Start Date | End Date |
|---|---|---|---|
| **3** | **Business Models** | **12/13/04** | **05/08/05** |
| 3.1 | Establish baseline models in the 4 MDs | 12/13/04 | 01/30/05 |
| 3.1.1 | Coordinate with Business Case Group | 12/13/04 | 01/30/05 |
| 3.1.2 | Develop questions to ask MD's to define their models | 12/13/04 | 01/09/05 |
| 3.1.3 | Flow-chart work allocation process for each MD | 01/10/05 | 01/16/05 |
| 3.1.4 | Review and standardize flow charts | 01/17/05 | 01/23/05 |
| 3.1.5 | Validate flow charts | 01/24/05 | 01/30/05 |
| 3.2 | Benchmark business models of outside organizations | 12/13/04 | 01/30/05 |
| 3.2.1 | Choose outside organizations | 12/13/04 | 01/09/05 |
| 3.2.2 | Create flow charts | 01/10/05 | 01/16/05 |
| 3.2.3 | Review and standardize flow charts | 01/17/05 | 01/23/05 |
| 3.2.4 | Validate flow charts | 01/24/05 | 01/30/05 |
| 3.3 | Optimize Business Model | 01/31/05 | 05/08/05 |
| 3.3.1 | Brief baselines to "business case" team & class | 01/31/05 | 02/06/05 |
| 3.3.2 | Define "constraints" in building the model | 02/07/05 | 02/13/05 |
| 3.3.3 | Draft model(s) | 02/14/05 | 03/13/05 |
| 3.3.4 | Vet with sponsors | 03/14/05 | 03/20/05 |
| 3.3.5 | Iterate with business case team | 03/21/05 | 05/08/05 |
| **4** | **Business Case** | **12/13/04** | **05/08/05** |
| 4.1 | Review Existing Business Cases | 12/13/04 | 01/31/05 |
| 4.1.1 | Upload BC examples to website | 12/13/04 | 12/31/04 |
| 4.1.2 | Ask Mary Kicza for Business Case Sample | 12/13/04 | 01/31/05 |
| 4.1.3 | Review Examples | 12/13/04 | 01/31/05 |
| 4.2 | Develop Business Case Template | 01/17/05 | 03/11/05 |
| 4.2.1 | Develop Business Case template | 01/17/05 | 01/28/05 |
| 4.2.2 | Align with recommended business model(s) | 02/07/05 | 02/27/05 |
| 4.2.3 | Draft boilerplate sections | 02/07/05 | 03/27/05 |
| 4.2.4 | Finalize template (March LDP workshop) | 02/28/05 | 03/13/05 |
| 4.3 | Develop Business Case | 02/07/05 | 05/08/05 |
| 4.3.1 | Collect/Analyze Data | 02/07/05 | 04/17/05 |
| 4.3.2 | Draft Business Case; send to class for review | 03/14/05 | 04/17/05 |
| 4.3.3 | Finalize Business Case (April LDP Workshop) | 04/18/05 | 05/08/05 |
| **5** | **Communication** | **12/13/04** | **07/17/05** |
| 5.1 | Document workforce concerns with current Business Model(s) | 12/13/04 | 03/04/05 |
| 5.1.1 | Review One-NASA Pulse questions/summary | 12/13/04 | 12/19/04 |
| 5.1.2 | Determine questions to ask | 12/20/04 | 01/16/05 |
| 5.1.3 | Select personnel to interview based on gaps | 12/20/04 | 01/16/05 |
| 5.1.4 | Consider using MIP/MEP/BEP class | 12/20/04 | 01/16/05 |
| 5.1.5 | Analyze data | 01/17/05 | 02/27/05 |
| 5.1.6 | Summarize results and provide to Business Model/Case Subteams | 02/28/05 | 03/04/05 |
| 5.2 | Develop strategy to gain Agency leadership support | 02/14/05 | 04/24/05 |
| 5.2.1 | Present draft strategy to LDP | 02/14/05 | 03/04/05 |
| 5.2.2 | Update and Present to Sponsors (dependent on model validation process) | 03/07/05 | 03/27/05 |
| 5.2.3 | Update and Present to Leadership Council | 03/28/05 | 04/17/05 |
| 5.3 | Develop key messages and roll-out strategy to workforce | 12/13/04 | 03/04/05 |
| 5.3.1 | Obtain PAO POC as a team member | 12/13/04 | 12/19/04 |
| 5.3.2 | Hire Marketing Firm and/or utilize PAO to benchmark marketing strategies | 12/20/04 | 02/27/05 |
| 5.3.3 | Present Benchmark results to LDP class | 02/28/05 | 03/04/05 |
| 5.4 | Roll-out to workforce | 04/25/05 | 07/17/05 |
| 5.4.1 | Develop roll-out package | 04/25/05 | 05/15/05 |
| 5.4.2 | Obtain PAO approval of package | 05/16/05 | 06/05/05 |
| 5.4.3 | Distribute to workforce | 06/06/05 | 07/17/05 |

## ACQUISITION SUMMARY

This project is accomplished almost entirely by the LDP 2004-2005 Class. Any contracting will be arranged by the LDP Manager, who will also conduct contract surveillance. A contract will be used to hire an external consultant to complete WBS 2.1.4, analysis of the collaboration interview data. An external consultant may also be hired for WBS 5.3.2, to develop a roll-out strategy and implementation plan. These small, limited-time contracts will likely be sole-source, cost-reimbursable.

## PROGRAM/PROJECT DEPENDENCIES

This project is a voluntary undertaking of the 2004-2005 LDP Class. As such, this project does not have any fundamental dependencies on other programs or projects. Having committed to the success of this project, and to maximize its impact, the project team will not reinvent any of the thoughtful studies that NASA has conducted recently related to competition and collaboration. In fact, this project will leverage, build on, and integrate these prior and emerging results, as well as other related studies, including:

1. NASA "Clarity" Team Report
2. One NASA products such as the Pulse and Competition Working Group Reports
3. Agency transformation results (Core Competency Plans, Strategic Roadmaps, Strategic Capability Roadmaps)
4. Collaboration Project of the 2003-2004 LDP class
5. FFRDC Study by Joan S. Salute
6. President's Commission on Implementation of United States Exploration Policy
7. President's Management Agenda
8. External studies of competition and collaboration, collected and analyzed in WBS 1.1.2.

## RISK MANAGEMENT

The primary risks in this project are:

1. Inability to define a cohesive and understandable yet usefully detailed business model and business case for optimizing competition and collaboration at NASA.
2. Insufficient time to complete the project as planned.

Risk #1 will be accepted without mitigation. In other words, it may be that achieving the goals of this project is not feasible in an organization as complex as NASA.

For Risk #2, this project will use four primary approaches to risk management:

Be flexible in project execution but firm in project goals. During project execution, the Project team will encourage project members to migrate to tasks that need additional effort. It is also possible to allow more time for the Phase II (product development), while compressing Phase III (product roll-out).

Conduct regular internal and sponsor status reviews, to illuminate any weaknesses of this work while they can still be corrected.

Acquiring additional labor support, for example by engaging an MIP or MEP class, or by hiring an additional consultant where appropriate.

Descope, mainly in WBS elements 3 and 4, which are in the critical path (tightest schedule). The main descope options are to baseline fewer than the four NASA Mission Directorates, benchmark fewer external organizations, and limit the complexity of the Business Model and Business Case. This final risk mitigation strategy is a last resort, since it would diminish the value and impact of our project.

## TEST AND VERIFICATION

The test and verification approaches are described in Sections 2 (Objectives) and 6 (Project Requirements).

## REVIEWS

This project will conduct periodic internal reviews as well as reviews by the NASA project sponsors, as described in Table 17-1.

Table 17-1. Reviews

| # | Review | Purpose | Content | Schedule |
|---|---|---|---|---|
| 1 | LDP Team Internal Reviews | Review sub-team progress and overall project status | Sub-team presentations, draft deliverables | Dec. 6-10, 2004<br>March 1-4, 2005<br>April 25-29, 2005 |
| 2 | Sponsor Status Meetings | Review project progress and direction with Agency sponsors | Project-level presentation and draft deliverables | Approximately monthly |
| 3 | Sponsor Final Review | Present final project results to Agency Sponsors | Project-level presentation and final documents and deliverables | May 23-27, 2005 |

## TERMINATION REVIEW CRITERIA

There are a few hypothetical scenarios during execution of this project under which termination of the project should be considered.

Sponsorship/Relevance: Inability to maintain executive-level sponsorship

Technical: Inability to identify specific, measurable, and valuable results

Schedule: No path to achieve minimum success by project deadline

Cost: No path to achieve minimum success within potential funding

At project kick-off, given the high level of effort invested in developing a strong project plan and engaging key executive sponsors, these scenarios seem quite unlikely to occur during the 8-month course of this project.

## TAILORING

This project plan was developed using NPR 7120.5b. However, this project has simple lines of authority, relatively small scope, and low budget. Also, this project is a study, and does not involve development or operation of systems. As a result, several of the standard NPR 7120.5b sections do not apply to this project and were omitted from this project plan. These sections are: Agreements, Safety and Mission Success, Environmental Impact, Technology Assessment, and Commercialization.

## CHANGE LOG

Table 20-1. Project Plan Change Log

| # | Date | Change Description | Rationale | Approved by |
|---|---|---|---|---|
| 1 | 12/20/2004 | Project Plan 1st draft (version 0.5) | Release for comment | Project Manager |
| 2 | 01/31/2005 | Project Plan Baselined (version 1.0) | Get Sponsor approval | Chris Williams, Mary Kicza, Jim Jennings, Adm. Craig Steidle |
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## Appendix F: Project Evolution

This brief appendix provides greater background with regards to how certain goals and objectives of the NASA Leadership Development Program (LDP) 2004-05 Class Project may have evolved or shifted over time. Where appropriate discussions are presented explaining these shift and changes.

**Goal 1:** Develop business models and supporting business cases that optimize NASA Mission Directorate use of collaboration and competition.

Objective 1.1: Produce a ***NASA Collaboration Handbook*** that defines collaboration principles and describes collaboration best practices.

Objective 1.2a: Develop a standardized method and taxonomy for the generation of business models describing organizational structure including means for illustrating and describing competed work, directed work, and situations of collaboration.

Objective 1.2b: Develop a business model data-collection template to support the collection of organizational information that can lead to the generation of organizational business models.

Shift from original objective: The original Objective 1.2 described the development of a unified template for business models across the agency. However, as work progressed on this objective, it became increasingly clear that no single template could be sufficient. Instead, what was pursued was a standardized means of generating business models and, in coordination with the OneNASA Competition Working Group, a standardized template for the collection of information to be used in the generation of specific business models.

Objective 1.3: Develop tools to be used in the generation of a business case for a particular circumstance that would enhance the application of the elements of competed work, directed work, and collaborative environments.

Shift from original objective: The original Objective 1.3 made reference to a singular process for optimizing the factors of competition and collaboration within the agency. Because it was found in the pursuit of Objective 1.2 that no singular business model template could be applied across the agency, no singular business case process could be described as universally applicable. However, what could be pursued was the development of useful tools whereby each unique organization could tailor their own business case analysis suited to their unique situation and needs.

Objective 1.4: Develop draft example business models representing agency mission directorates and other organizations that accommodate each organization's uniqueness.

Shift from original objective: The original objective stated the desire to cover nearly the entire agency as much as possible, but in particular all of

the various elements of the mission directorates. Due to the limited time and resources of the LDP class participants, this ambitious goal was scaled back. Nevertheless, the representative examples that were developed should still provide a roadmap for further activity in the future along these lines.

**Goal 2:** Communicate the project findings to both NASA senior management and the NASA workforce.

Shift from original goal. The original goal involved the initiation a culture change within the agency based upon the results of this project. Because the measurement of such a change is difficult, it was decided to alter the wording of the goal towards something that can be quantified. However, this does not alter the fact that the long-term desired goal of culture change remains. Rewording the goal simply allows for a more bounded project in this regard.

Objective 2.1: Develop a NASA-wide roll-out plan.

Shift from original objective. The original objective included an "infusion roadmap" which, considering the content of the roll-out plan, also called the communication plan, is no longer necessary.

Objective 2.2: Present results to NASA management.

Objective 2.3: Present project results and messages to at least one audience at each center.

Shift from original objective. The original objective included the clause "...with a generally favorable response." This cannot be measured, and hence has been deleted.

Objective 2.4: Integrate findings and recommendations into NASA Transformation activity (e.g., One NASA).

**Goal 3:** Project will provide a significant leadership development experience to the LDP 2004-05 Class.

Objective 3.1: Ensure that at least 33% of class has taken on a task or project leadership role for project.

Objective 3.2: Ensure that at least 50% of class has made an oral presentation for the project to a project sponsor.

Objective 3.3: Ensure that at least 75% of class feels they have met this goal.