

National Aeronautics and Space Administration

RESEARCH PARTNERSHIP SUBCOMMITTEE

OF THE

BIOLOGICAL AND PHYSICAL RESEARCH  
ADVISORY COMMITTEE

April 6, 2004  
NASA Headquarters  
Washington, D.C.

**MEETING REPORT**

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**Dr. Lance Bush**  
Executive Secretary

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**Mr. Stephen Day**  
Chair

**RESEARCH PARTNERSHIP SUBCOMMITTEE (RPS)**

April 6, 2004  
NASA Headquarters  
Washington, D.C.

**MEETING REPORT  
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**RESEARCH PARTNERSHIP SUBCOMMITTEE (RPS)**

April 6, 2004  
NASA Headquarters  
Washington, D.C.

Welcome and Introduction

Mr. Stephen Day, chair of the Research Partnership Subcommittee (RPS), opened the meeting with comments on the objectives of the RPS. The RPS can add value to Space Partnership Development by tapping into the collective experience of subcommittee members. Its recommendations should be implementable and aligned with NASA priorities. NASA has a brand name that can bring substantial value to commercial research partners. Mr. Day then asked the members and visitors to introduce themselves and summarize their backgrounds, as several of the members are new to the RPS.

Overview

Dr. Frank Schowengerdt, Director of the Space Partnership Development (SPD, also Space Product Development) Division, reported on SPD status. He also discussed the NASA Exploration Initiative announced in January by the President, exploration product lines in the Office of Biological and Physical Research (OBPR, Code U), the new SPD exploration thrusts to align with these NASA and OBPR priorities, and SPD budgetary issues. At a forum on April 7, the directors of the Research Partnership Centers (RPCs) will describe their plans for fitting into the Exploration Initiative.

The SPD Program is not technology transfer or commercialization of NASA-developed technology or products. NASA has other programs for technology transfer. Rather than the program selecting private companies upon which to bestow competitive advantage, the 15 RPC directors work to develop commercial-sector interest in participating in space research partnerships with NASA and university-based researchers. SPD enables its commercial partners to access the space environment to conduct focused research. The aim of that research is to lead to technology and products of commercial value to the partnering companies. In Dr. Schowengerdt's view, SPD is NASA's flagship program for commercial development in space, beginning with the International Space Station (ISS) in low Earth orbit (LEO) and extending to outer space environments. The strategic advantage of the SPD approach is in research areas that need the contribution provided by each of the three partners in a project: a commercial entity, university-based expertise, and NASA. The RPS members discussed with Dr. Schowengerdt NASA's original objectives in creating the SPD Program and analogues for this type of public-private cooperative effort, such as the Cooperative Extension Service (agricultural research universities, private farmers, and the Department of Agriculture) and the Bayh-Dole Act, which released biomedical intellectual property for licensing by universities.

Dr. Schowengerdt continued with the organizational position of the SPD Division within OBPR and NASA. The current SPD mission statement was developed in the summer of 2003 after Dr. Schowengerdt became the Division Director. In the history of the RPCs (formerly called Commercial Space Centers, or CSCs) since 1985, there have been three external independent reviews, with the third in progress now. These reviews have led to

closing of seven RPCs and transfers of six others to other NASA programs. Of the current 15 RPCs, only one is not located at and contracted with a university.

Dr. Schowengerdt listed fiscal year (FY) 2003 outcome indicators such as patent awards, publications, degrees awarded, and commercial, academic, and government affiliates of the RPCs. He used four quantitative output/input indicators, based on FY 2002 data, to compare the productivity of the SPD Program with other OBPR divisions. Another productivity indicator, which illustrates the potential value of the SPD Program to NASA goals, is the relative cost of spaceflight hardware developed in-house at NASA Centers, compared with the cost for comparable development in an RPC project. The example used by Dr. Schowengerdt compared the \$248 million cost for NASA to develop the Fluids and Combustion Facility (FCF) with the \$27 million cost to develop Space-DRUMS™ by the Center for Commercial Applications of Combustion in Space (CCACS), an RPC at the Colorado School of Mines. As an indicator of the relative reliability of SPD flight hardware, Dr. Schowengerdt compared the anomaly rate for SPD payloads (17 percent) with the non-SPD payloads flown by other OBPR programs (18 percent).

Much of the SPD-developed equipment now on the ISS is inactive because of lack of Shuttle flights to provide upmass and downmass for testing and experiments that use the equipment. The Commercial Generic Bioprocessing Apparatus (CGBA) is being used to a limited extent. Space-DRUMS and other RPC-developed items are waiting for Shuttle flights to the ISS. Before the mission was lost, STS-107 (the last flight of the Shuttle *Columbia*) produced substantial research returns through data delivered by telemetry and from three intact bottles retrieved from the *Columbia* debris. As examples of the broad commercial potential of RPC partnerships with private industry, Dr. Schowengerdt cited: (1) the HDMAX ultra-high resolution camera, (2) treatment of bone calcium loss in space-based mice with osteoprotegerin, (3) porous ceramic biomaterials that have superior characteristics when produced in microgravity, and (4) increased microbial production of antibiotics in microgravity.

In the fall of 2003, the Office of Management and Budget (OMB) directed the SPD Division to realign its activities to serve NASA needs and reduced the division's budget. The OMB position reflected an Administration policy that applied research supported by Federal funds should support Agency missions. In response to a question on why OMB dislikes the program, Dr. Schowengerdt said that OMB and others view it as an entitlement program for the RPCs, which should be ended.

A second realignment began in January 2004 when the President announced the Exploration Vision for NASA. Dr. Schowengerdt presented his RPC Realignment Roadmap, which responds to these directives. The challenge for the Exploration Initiative is funding. The funding for exploration is constrained, and continued funding will depend on delivering products on time. To sustain bipartisan support through multiple administrations, exploration will need to provide benefits to taxpayers. In this environment, Dr. Schowengerdt believes that SPD provides a leveraging advantage. For example, only 28 percent of SPD Program resources in FY 2002 came from the SPD

budget (less if in-kind contributions from industry and university partners are included in total resources). SPD has also established a track record for delivering products (applications and commercializations) and research results (measured by research publications), while producing tangible benefits to U.S. taxpayers. As the RPCs have shifted to focusing on NASA as a customer, the number of projects with at least partial funding from non-SPD NASA sources is increasing; the number nearly tripled from 16 in FY 2001 to 44 in FY 2003. In dollar value, the major NASA customers are the Spaceflight Enterprise (Code M) and Earth Science Enterprise (Code Y).

OBPR has identified five *exploration product lines* on which its programs will focus. The top three of these are human health in space, human life support during spaceflight, and radiation protection/effects assessment. Dr. Schowengerdt listed SPD projects that are viewed as supporting these product lines and that will be funded in FY 2005. He also listed projects that will not be funded by SPD because they do not fit with the new OBPR product lines. Multiple RPCs can align with each of the OBPR product lines. For the RPCs, there are four *exploration research thrusts*: (1) Space Resources and Manufacturing, (2) Spacecraft Technologies, (3) Technological Applications at the Biological/Physical Interface, and (4) Human Health Support Technologies. Dr. Schowengerdt listed product focus areas and focusing projects (initial efforts requiring near-term results) for each of these research thrusts. His strategy for the SPD Division and the RPCs is to grow the proposed SPD budget through funding from other parts of NASA and other agencies for focusing projects in the four research thrusts. At least two RPCs will be closed or re-competed in FY 2005. This entrepreneurial approach aims to achieve a 1-to-3 leveraging of limited SPD resources with outside resources by FY 2006. The driver for this leveraged resource growth is that the SPD Program cannot be sustained with the FY 2005 SPD budget alone. The program must either leverage those resources or terminate. The Code U Associate Administrator agrees with this approach and sees the SPD Division as providing linkage to other parts of NASA for all of OBPR.

During the discussion period, the RPS members discussed the new scope of the SPD Program, the role of the RPS as an adviser and advocate for research partnerships, the role of SPD Division staff in implementing the strategy, and the role of the RPC directors as advocates with funding decision-makers. Access to space for industry partners, with the Shuttle fleet grounded, was discussed. The crux of the argument for keeping the SPD Program, Dr. Schowengerdt said, is that benefits to the public are essential to sustaining a robust human space exploration program. SPD can create those benefits through cost-effective leveraging with its industry partners.

#### Independent Review Results

Steve Lambing, Deputy Director of the SPD Project Office, provided an update on the SPD Independent Review being conducted by Booz Allen & Hamilton. In describing the purpose of the review, he noted that it plays a role analogous to that of external peer review of projects. Periodic independent review of the program is required by Federal law.

Each RPC has now been reviewed. The first RPC review was in September 2002; the last was completed in March 2004. A summary report of the first ten RPCs to be reviewed was delivered in August 2003; the summary for the remaining five RPCs and the final program review are due May 5, 2004. A Review Findings Report delivered in August 2003 assessed the overall SPD Program on the basis of interviews by Booz Allen & Hamilton at the first ten RPCs. The review summary for these ten RPCs, also delivered in August, compared and contrasted those RPCs and identified best practices. All of the review documents delivered thus far are available as either Microsoft Word or Portable Document Format (PDF) documents on the RPC Forum web page at <http://asteroid.tamu.edu/taskmgr/login.php>. The results will be presented to and used by Dr. Schowengerdt and the Code U Associate Administrator. The audience to which the final review reports are targeted includes Code U management, other division directors, other NASA Enterprises, the NASA Administrator's office (Code A), Congress and congressional staff, OMB, and the public.

During discussion, RPS members asked about the expected conclusions in the final report and whether the value of the results will be affected by the realignments of SPD direction and priorities, which occurred after the review contractor was tasked. Dr. Schowengerdt replied that the fundamental qualities and capabilities of the individual RPCs will be the same. The comparison of the individual RPCs will show that they occupy a spectrum of approaches and technical areas of expertise, as well as differences in quality. Mr. Lambing noted that the same period of performance, from FY 2000 through FY 2002, is being applied to all the centers. The RPS discussed ways of reviewing the quality of the science being done in the RPCs, considering SPD as an applications development program, as well as the business and technology partnership fundamentals of the RPCs. Recent examples of commercial application development through partnering between university-based researchers and the private sector were discussed as a paradigm, assuming that NASA is now driven more by the need for solutions than by scientific inquiry for its own sake. Another point made was that even solution-driven research and development (R&D) requires assessment of the quality of the science on which it depends. There was agreement that internal R&D within NASA probably requires different mechanisms of external quality review than do the RPC R&D projects with commercial partners.

#### New Scope and Terms of Reference of RPS

Dr. Schowengerdt described the mission and objectives of the RPS as advising the SPD Division and Code U on the research partnership program. The terms of reference have been changed from those of the predecessor entity, the Commercial Advisory Subcommittee, to reflect the emphasis now on SPD as a dual-purpose program serving NASA's needs, as well as the needs of the industry partners in the RPC projects. Dr. Lance Bush, the Executive Secretary of the RPS, reviewed the new terms of reference and the changes. **Action Item: RPS members should review the RPS terms of reference and send any comments, including suggestions for changes, to Dr. Bush by May 31. Dr. Bush will consolidate the comments and pass the suggested changes to Mr. Day and Dr. Schowengerdt for review and approval.**

The members discussed RPS representation on its parent committee, the Biological and Physical Research Advisory Committee (BPRAC). Both BPRAC and the RPS are formal advisory committees to the Code U Associate Administrator under the Federal Advisory Committee Act (FACA). The members and staff discussed selection of three or more RPS members to serve on the BPRAC and the role that the BPRAC plays in affecting NASA programs and policy. Mr. Day, as RPS chair, is automatically a BPRAC member, and the current terms of reference allow for two additional RPS members to be named to the BPRAC. In response to a question and discussion about additional representation, Dr. Bush suggested that a reasoned case should be presented to Ms. Kicza, if the RPS wants to have a fourth position on the BPRAC. A fourth position would allow for coverage at the BPRAC meetings in case of schedule conflicts for one or more of the RPS members. Dr. Schowengerdt noted that all other BPRAC subcommittees corresponding to Code U divisions have been dissolved. Mary Kicza, the Associate Administrator, is restructuring the BPRAC subcommittees along product lines rather than organizational lines. The members discussed the need for a concise rationale for a fourth position and the public nature of all formal RPS written documents. **Action Item: The RPS decided to nominate RPS members for two positions on the BPRAC (with Mr. Day as a BPRAC member already) and to prepare a written rationale for a fourth RPS position. In addition to Mr. Day, Larry Austin and Stephen Solomon were nominated as RPS representatives to the BPRAC. If a fourth position is approved, Dr. Glenn Spaulding was selected as the RPS nominee.**

The Space Station Utilization Advisory Subcommittee (SSUAS) of the BPRAC is being reinvigorated. RPS members commented on expertise areas that have been lacking on the SSUAS, including clinical areas related to human health issues in extended spaceflights. SSUAS has a role in evaluating projects to fly on the ISS and providing recommendations on upmass and downmass priorities. The standup of the ISS Research Institute (ISSRI) as a nongovernmental entity to guide ISS research was suspended following the announcement of the Exploration Initiative in January. **Action Item: The RPS nominated Jay McDonald, Charles Doarn, and Ray Askew to serve on the SSUAS, with Michael Jacox nominated as a backup if a member cannot attend a SSUAS meeting.**

RPS representation on the NASA Advisory Council (NAC) was proposed and discussed. The mechanism for gaining an appointment to the NAC requires a recommendation from the Code U Associate Administrator to the NASA Administrator. Mr. Austin suggested Dr. Seymour Papert, Professor Emeritus from Massachusetts Institute of Technology and cofounder with Marvin Minsky of the Artificial Intelligence Laboratory, as a member of the NAC. Areas of expertise of the current NAC members were discussed. Dr. Bush suggested that the RPS could invite sitting NAC members to meet with the subcommittee, as another avenue for making RPS views known. **Action Item: Dr. Askew suggested that Mr. Day attend the next full NAC meeting as an observer and report back to the RPS, which will then consider candidates to nominate for a position on the NAC.** The next two meetings of the NAC are June 8-9 in Washington, D.C., and September 14-15 at Goddard Space Flight Center (GSFC).

**Action Item: Mr. Day asked Dr. Askew to draft a rationale for additional RPS representation on the BPRAC.**

Committee Discussions

Dr. Bush reviewed the NASA vision and mission statements from the 2003 NASA Strategic Plan. Total OBPR funding of \$877 million for FY 2004 constitutes 6 percent of the NASA budget. The line item for Research Partnerships and Flight Support (\$257 million) includes Mission Integration activities, as well as the SPD Division budget. The SPD budget is decreasing from \$31 million in FY 2003 to \$11 million in FY 2005. Dr. Bush and other NASA staff answered members' questions on budget components and their relation to SPD projects.

To open the general discussion, Mr. Day remarked that there are good programs across the RPCs, covering a broad array of applications. He repeated his opening point that the NASA brand name is an asset that could be used more effectively. He asked the subcommittee to address the question of where the RPS could be useful. Dr. Askew said that, as an advisory committee, the RPS has to live within the rules of the entity it is advising. Code U and NASA appear to be moving from a science-support focus to providing capabilities and solutions for the Exploration Initiative. In this new environment, Code U has to deliver on specific objectives, such as solutions for bone mass loss during extended spaceflight and radiation exposure of astronauts beyond LEO. The solution-oriented model used in the RPCs can be applied to these objectives. Mr. Austin suggested that the limited SPD budget could be viewed as "seed capital," and the program has the challenge of marketing its value and its presence. The members discussed the value proposition for commercial partners to engage in RPC-mediated work that supports NASA objectives, as well as the commercial objectives of partners. The NASA name might be part of the value proposition.

The RPC discussed how SPD and/or selected RPCs could respond to the needs and objectives of the Office of Exploration Systems (Code T). If past SPD payloads are assessed against the new Exploration Initiative objectives, half or fewer would be relevant. Another issue considered was whether the collective capability of the RPCs provides synergy to the capability represented in the NASA Centers. However, the SPD Program and the RPCs still must provide value to industry, or the partners bidding for NASA work will be indistinguishable from any other bidder. Mr. Solomon said that, because RPC capabilities do not appear to be widely known or appreciated within NASA as their principal customer, marketing methods such as a brochure, targeting the customer base, are needed.

Discussion with the Code U Associate Administrator

Ms. Kicza joined the meeting at about 3:30 p.m. The RPS members introduced themselves. Mr. Day and Dr. Schowengerdt summarized the topics that had been discussed. Ms. Kicza presented the President's Vision for U.S. Space Exploration as it was announced in January. The rationale is to lift the national spirit, improve the quality of life on Earth, and inspire future generations. She views the SPD Program as an important mechanism for the goal of improving the quality of life on Earth, and she asked

the RPS members to provide their thoughts on how to communicate that goal and the SPD capability to contribute to it. Along with other NASA senior managers, she will be visiting the 50 Explorer schools to talk with students, and communicating this goal is one of her aims. To realize the exploration vision, an exploration culture will have to be fostered and sustained across generations. **Action Item: Ms. Kicza asked the RPS for suggestions on how she and other NASA managers could communicate the goal of benefiting life on Earth, and the SPD capability to contribute to that goal, to the public and especially to the next generation (K-12 students).**

In the context of making the Exploration Initiative affordable and sustainable, the Moon is a way station for testing systems of technology, which will enable flights to further destinations. Next steps include new spaceships to send robotic and human explorers into deep space. Code U products to support these milestones will be designed, developed, and produced in a different way than by the science-driven approach used by NASA in the recent past. The new head of Code T is applying an implementation model brought from his Department of Defense experience with executing large projects. OBPR is realigning its role and activities to fit the Presidential directive. Research on the ISS will now emphasize support to the Exploration Initiative and preparation for human spaceflight to other bodies in the solar system. The realignment process in OBPR began with an inventory of the research base, both on the ISS and on the ground, to determine what is and is not relevant to the Exploration Initiative objectives. A linchpin for the exploration vision is protection of human crews, which falls within OBPR's scope. A road map is needed of objectives to mitigate the risks to crew health and safety, including countermeasures to the negative health consequences of extended weightlessness. OBPR staff used the existing Critical Path Roadmap to assess where the risks are for each stage in the exploration timeline. The National Research Council and the Institute of Medicine have been engaged to review this roadmap, which will be available on the OBPR website by mid-April. Concurrently with this roadmap development activity, the Office of the Chief Medical Officer has an objective of setting acceptable limits for human operational parameters in space. Another task is to evaluate how many test subjects are needed on the ISS to validate medical countermeasures.

Code U is also beginning to identify specific products it must deliver to support the exploration objectives. These products are in the areas of human health, radiation shielding, autonomous medical care, closed-loop life support, and environmental [within the spacecraft] monitoring. A systems analysis team is identifying the products and work breakdown structures necessary to meet exploration time lines. All of the NASA Centers and the RPCs will have the opportunity to show where they can contribute to the work needed. Code U is working with the Office of Space Science (Code S) to identify the first payload to fly on the first Lunar Robotic Orbiter in 2008. Radiation environment monitoring is a top priority. Other work with Code S include the Mars Test Bed Lander, planned for 2011. Code T will write the Level 1 requirements, and Code U has a liaison to the requirements writing team. Code U is switching from its previous focus on fundamental research to applied research. Still, the fundamental research done previously is providing the base for this new generation of application. There will need to be a

continuation of fundamental research to provide the knowledge base for subsequent generations of application development.

Mr. Day asked about the direction coming from Congress. Ms. Kicza answered that she thought the Senate was currently working with the President's budget request levels, while the House of Representatives is holding OBPR funding at FY 2004 levels. Details on what will go forward and what will be cut are not yet available. OBPR program managers are trying to respond to the needs of their principal investigators (PIs) in the universities, whose support for graduate students will be affected by the funding decisions. Future Code U research announcements will be much more focused in terms of schedule and required deliverables. More emphasis will be placed on teaming and on interim oversight.

Mr. Jacox asked how the fourth objective in the President's vision, which includes promoting commercial participation in exploration to further U.S. economic interests, relates to OMB efforts to cut or eliminate SPD funding. Ms. Kicza repeated the points that Dr. Schowengerdt had made earlier about OMB's view and added that the fourth objective applies at a much higher level of commercial participation [than individual research partnerships for specific projects]. It pertains to meeting commitments to International Partners on the ISS and to opportunities for commercial participation in Code T R&D. The Nation's resources, not just those of NASA centers, will be needed to meet the objectives. She is seeing positive signals from NASA's International Partners in terms of cooperation on exploration objectives, as the implications of the Exploration Initiative become clearer. Dr. Bula asked whether the new presence on the moon is viewed as longer visits or a permanent base. Ms. Kicza said that the Moon is being viewed as a test bed for technologies and approaches, not as a permanent base for launching missions. She discussed with the members the human health implications of moving from short-term visits to the Moon or Mars to establishing a long-term human presence in space.

Dr. McDonald asked where in NASA the fundamental research will be done to meet crew health objectives. Ms. Kicza said she was looking for input from the medical field on the amount and directions of research that will be needed. Dr. Bula said that the research needed depends on the problems one is trying to solve. Ms. Kicza has asked the leads for each of the product areas in the OBPR exploration product lines to analyze the basic research that is needed to achieve the objectives. Dr. Spaulding said that decisions on acceptable levels of risk are needed first, before one can assess the amount of fundamental research needed. Ms. Kicza agreed that the problems involved in making the decisions were difficult and said she would welcome input from the members. Dr. Askew suggested that a ratio of about 10 to 1 between application-directed R&D and fundamental research is likely to be appropriate, based on corporate R&D budgets.

Mr. Day asked Ms. Kicza about her expectations of advice from the RPS. She said that, given the OBPR realignment in how research is undertaken, there is increased relevance to her needs in the expertise that RPS members have in managing research to meet a specific objective by a specific time. She will welcome any advice that the RPS or

individual members can offer on how to do research for design (applied research) and how OBPR is implementing processes for meeting R&D objectives. Another topic for advice is how OBPR can demonstrate improvements to life on earth and communicate those accomplishments. A third area is prodding the organization to integrate the vast array of capabilities available in the commercial partnerships—how to take advantage of the opportunities they provide. Broader than the RPCs, how should Code U and NASA be partnering with industry to accomplish Exploration Initiative goals? Dr. Askew asked whether the leveraging of commercial partnering makes a difference to the NASA decision-makers. Ms. Kicza said that NASA faces the challenge of delivering products within a stable funding profile. So there is perceived value in leveraging. However, the NASA team has to be open to other ways of doing things than have been used in the past. The RPS needs to ensure that NASA people at the top are aware of remaining obstacles and shortcomings in realizing the value of leveraging with commercial partners.

Dr. Bula related Ms. Kicza's comments to the RPS presence on the BPRAC and the importance of expressing RPS experience and perspectives at that level of advisory input to Code U and NASA. Mr. Day explained that the RPS would be recommending that three and perhaps four of its members serve on the BPRAC. Ms. Kicza asked the RPS to provide its recommendations, and she would consider them. She agreed with the value of a strong industry posture on the BPRAC. Dr. McDonald said that the RPCs are free agents with respect to choices about realignment with NASA priorities. They may have limited interest in focusing on what NASA wants. However, OBPR and the SPD Division must target the limited resources available to ensure that NASA objectives are met. Ms. Kicza thanked the members for their time, expertise, and insights.

#### Wrap-up and Recommendations

Mr. Austin suggested that the Dr. Schowengerdt's input/output charts for SPD productivity could be used by the RPS members to convey the status and value of the program to those who could influence decisions about SPD funding, including members of Congress. He encouraged the RPS members to serve as advocates for the program. Dr. Frederick Best, Director of the Center for Space Power, offered to make available to the members a four-page summary of RPC activities.

Mr. Day asked how communication efforts by the RPS would integrate or overlap with communications from the NASA Public Affairs Office. Dr. Schowengerdt said that the levels of communication are different and would not overlap.

Dr. McDonald described the SPD Program as being on probation. The challenge is to show how the leveraging can be increased even more. Mr. Solomon said that the program's vitality depends on marketing its internal (NASA) customers. NASA managers who could use RPC capabilities or products apparently need to be convinced or educated about the value of the special attribute of partnerships that engage industry, university, and NASA resources on a specific product or objective. Dr. McDonald suggested that SPD funds need to be directed to a few substantial efforts that can make a clear difference in meeting NASA needs, rather than dividing them among many efforts that are controlled more by RPC interests as free agents than by NASA objectives. Mr. Doarn said that the internal NASA customers need to be better informed about the RPC

capabilities broadly and what they have done, not just single products or results. Otherwise, NASA managers will just turn to the NASA Centers to repeat work that RPCs have already done. The RPCs must work together in some way. They and the SPD Division have to communicate the advantages of the process used by the RPCs to achieve results, which has often been more efficient than the peer-reviewed science process typical of other Code U programs. **Action Item: Mr. Doarn also asked Dr. Schowengerdt for material describing whatever guidance or criteria the SPD Division uses in trimming down or closing RPCs.** Mr. Doarn suggested that, unless the remaining RPCs can cover areas of expertise represented in RPCs that are closed, NASA as a whole will lose opportunities and expertise from the closures.

Mr. Jacox made several points. First, the SPD Program and the RPCs need to understand who their NASA customers are and what their product offering is. The program needs to differentiate itself from other approaches to getting products it can deliver. Second, the SPD research thrusts are not completely aligned with the top three OBPR exploration product lines. Based on the OBPR product lines, that set of research thrusts does not seem justified. Perhaps there are markets outside Code U for products such as advanced propulsion systems. If so, how can the program and the RPCs approach these customers to market their products? Third, Mr. Jacox sees many points of connection on the President's Vision slide (the four objectives) into which RPC capabilities can hook, so that the program is expanded rather than contracted. Dr. Schowengerdt explained that the SPD research thrusts were developed in response to the OMB directive to align with NASA objectives as they stood as of the fall of 2003. Further realignment to the Exploration Initiative and the OBPR exploration product lines is in progress.

Dr. Askew said that the political interest in SPD will be tested when Dr. Schowengerdt gives his set of RPC cuts to the NASA Controller. If cuts based clearly on performance measures are not accepted as adequate, then it will indicate that the preference is simply to kill the program. If the proposed program is accepted, then there should be opportunity to show how the RPCs can contribute to exploration objectives and build support for growing the program. **Action Item: Mr. Doarn suggested that the letter to the BPRAC include a comment endorsing the fourth objective in the Exploration Vision statement but questioning the rationale for cutting the SPD budget, if that objective is significant.** If the comment wins support from the BPRAC and goes forward to the NAC, support for the program can be built from all three advisory committees.

Dr. Bula said that companies considering participation in an RPC project want to know what benefit there is to them. Before, the competitive edge that could be offered was access to space. Now, however, it is unclear whether participation still provides a competitive advantage for participating companies. He asked if RPC directors have experienced increasing difficulty with enlisting company participation. Dr. Schowengerdt said that he had not heard that concern yet from RPC directors. His view is that creation of benefits to the public requires that technology or products have dual use, with the commercial partner getting the benefit of the commercial use. The brand name value of the association with NASA is another competitive advantage. The SPD process is much more active and dynamic for a potential commercial partner than just waiting for NASA

to create technology and transfer it to companies for commercialization. Dr. Askew added that, in the very long list of exploration-tied products that came out of the OBPR bottom-up review in Houston at the end of March, about half of the items have dual-use potential. The role of an RPC director interested in providing one of those items for NASA is to sell the concept of a joint venture with NASA to an industry partner for its subsequent commercial use. Broadly speaking, RPC directors have always done this. The difference now is that the opportunities to serve NASA are in a NASA-created list. Dr. Best agreed that there were items of commercial interest among the high-priority NASA technology needs in the area covered by his RPC. Another advantage now for a potential commercial partner is that the opportunity to sell a product initially to NASA is greater than before. This early market can provide a pathway toward longer-term commercial applications.

Dr. Bush noted that the next BPRAC meeting is May 20-21, 2004, in Washington, DC. Because it is a public meeting, RPS members are free to attend as visitors. Dr. Schowengerdt added that, RPS meetings will normally be scheduled for the day before the BPRAC meets. The next BPRAC meeting after May is November 4-5, 2004.

**Meeting of the Research Partnership Subcommittee (RPS)**

NASA Headquarters

April 6, 2004

9:00 a.m.	Welcome and Introductions	Mr. Day
9:30 a.m.	Overview SPD Status Report -NASA Exploration Agenda -OBPR Exploration Product Lines -SPD Exploration Thrusts -Budgetary Issues	Dr. Schowengerdt
11:00 a.m.	Independent Review Results	Mr. Nall
12:00 noon	Lunch	
1:00 p.m.	Mission and Objectives of RPS -New Scope -New Terms of Reference	Dr. Schowengerdt
2:00 p.m.	Committee Discussions	Mr. Day/All
4:30 p.m.	Wrap-up/Recommendations	Mr. Day
5:00 p.m.	Meeting Adjourn	

**National Aeronautics and Space Administration  
Research Partnerships Subcommittee**

**Members**

**Mr. Stephen Day, Chair**  
Washington, DC

**Dr. Raymond Askew**  
Texas A&M University

**Mr. Larry J. Austin, Esq.**  
Starwalker Group

**Dr. Raymond J. Bula**  
Cross Plains, WI

**Mr. Charles Doarn**  
Department of Surgery  
University of Cincinnati

**Mr. Michael G. Jacox**  
Star Vision Technology, Inc.

**Dr. Jay McDonald**  
Director, Center for Metabolic Bone  
Disease  
University of Alabama at Birmingham

**Mr. Stephen Solomon**  
Brooklyn, NY

**Dr. Glenn F. Spaulding**  
Houston, TX

**Dr. Lance Bush**  
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**RESEARCH PARTNERSHIP SUBCOMMITTEE**

April 6, 2004  
NASA Headquarters  
Washington, D.C.

MEETING ATTENDEES

*Subcommittee Members:*

Day, Stephen. <i>Chair</i>	
Askew, Ray	Texas A&M University
Austin, Larry	Starwalker Group
Bula, Raymond	
Doarn, Charles	University of Cincinnati
Jacox, Michael	StarVision Technologies, Inc.
McDonald, Jay	University of Alabama at Birmingham
Solomon, Stephen	
Spaulding, Glenn	

*NASA Attendees:*

Bush, Lance	Headquarters, Code US
Casas, Joseph	Headquarters, Code US
Dees, Gregory	Headquarters, Code US
Emond, John	Headquarters, Code US
Lambing, Steve	NASA
Livingston, Candace	Headquarters, Code US
Nall, Mark	Marshall Space Flight Center
Schowengerdt, Frank	Headquarters, Code US
Widder, Joel	JPL/California Institute of Technology

*Other Attendees:*

Best, Frederick	Center for Space Power, Texas A&M Univ.
Boyle, David	Spacecraft Technology Center, Texas A&M Univ.
Brandhorst, Henry	CSPA, Auburn University
Gathings, William	CMDS, Univ. of Alabama at Huntsville
Glenn, William	Imaging Technology Center, Florida Atlantic Univ.
Katt, Robert	INFONETIC
Shank, Chris	Staff, U.S. House of Representatives Science Committee
Stodieck, Louis	Bioserve Space Technologies, Univ. of Colorado-Boulder

**RESEARCH PARTNERSHIP SUBCOMMITTEE**

April 6, 2004  
NASA Headquarters  
Washington, D.C.

LIST OF PRESENTATION MATERIAL<sup>1</sup>

1. Frank Schowengerdt, Director, Space Partnership Division. *Space Partnership Development: An Introduction*. April 6, 2004.
2. Bruce Lambing, *Status and Summary of the Independent Review for the Research Partnership Subcommittee*. April 6, 2004.
3. *National Vision for Space Exploration* (Five-slide briefing package).
4. Associate Administrator, Office of Exploration Systems, *Office of Exploration Systems*. March 2-3, 2004.

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<sup>1</sup> Presentation and other materials distributed at the meeting are on file at NASA Headquarters, Office of Biological and Physical Research, Washington, DC 20546.