Appendix E:
ROM Costs Associated with Current Organization and Content for ISS Utilization and Research Program Management

February 2001 OMB Passback is not reflected (~ 37% overall cut)

Appendix E: ROM Costs Associated Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
TOTAL IN-HOUSE WORKFORCE:	717	703	692	706	689
TOTAL IN-HOUSE COSTS:	89.6	96.0	110.1	107.9	108.0
TOTAL CONTRACT COSTS:	312.2	305.6	348.0	366.0	373.1
GRAND TOTAL COST:	**402.3**	**402.1**	**458.6**	**474.4**	**481.6**

- Costs represent RY $M order-of-magnitude based on 2000 POP process; no attempt was made to fine-tune estimates for study purposes.
- Field centers were asked to use local overhead rates in converting workforce to cost (1.4 multiplier used for HQ).
- Detailed breakouts in following pages.

Appendix E: ROM Costs Associated with Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
Functions of Headquarters					
- In House Workforce	2.5	5.0	7.5	10.0	12.5
- In House Costs	0.35	0.70	1.05	1.40	1.75
- Contract Costs	19.57	39.33	42.15	42.67	48.39
-- Global Science & Technology (Peer Review)	0.42	0.83	1.25	1.67	2.09
-- Flight Principle Investigator Grants	19.15	38.50	40.90	41.00	46.30
total cost of function:	**19.92**	**40.03**	**43.20**	**44.07**	**50.14**
Functions of JSC/Space Station Program Office					
- In House Workforce	30	30	30	30	30
- In House Costs	3.33	3.33	3.33	3.33	3.33
- Contract Costs	30.40	26.97	21.93	17.33	20.85
-- United Space Alliance (Payload Ops & Facility Engr)	3.34	3.53	3.71	3.81	3.98
-- Boeing (Payload Engineering & Integration)	24.66	20.56	15.22	10.52	13.87
-- Lockheed-Martin (Payload Office Support)	1.10	1.58	1.60	1.60	1.60
-- Science Applications Int'l (Program Office Support)	1.30	1.30	1.40	1.40	1.40
total cost of function:	**33.73**	**30.30**	**25.26**	**20.66**	**24.18**

Appendix E: ROM Costs Associated with Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
Functions of MSFC/Payload Operations					
- In House Workforce	185	151	134	129	117
- In House Costs	25.90	21.14	18.76	18.06	16.38
- Contract Costs	86.15	66.19	69.18	69.66	69.23
-- Boeing (Payloads Utilization)	61.15	48.43	49.60	49.44	49.09
-- Lockheed-Martin (Utilization & Mission Support)	25.00	17.76	19.58	20.22	20.14
total cost of function:	**112.05**	**87.33**	**87.94**	**87.72**	**85.61**
Functions of KSC/Payload Processing					
- In House Workforce	33	32	32	32	32
- In House Costs	4.62	4.48	4.48	4.48	4.48
- Contract Costs	8.99	7.79	8.48	10.18	12.74
-- Boeing (Utilization Support)	6.81	5.58	6.04	7.52	10.06
-- Dynamac (Life Science Support)	2.18	2.21	2.44	2.66	2.68
total cost of function:	**13.61**	**12.27**	**12.96**	**14.66**	**17.22**

Appendix E: ROM Costs Associated with Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
Functions of MSFC/Research Program Office					
- In House Workforce (MSFC + GRC)	416.6	432.7	436.5	447.4	443.1
- In House Costs (MSFC+GRC)	50.38	60.67	76.01	73.92	75.67
- Contract Costs (MSFC + GRC)	135.21	130.63	156.36	172.03	167.49
-- Teledyne Brown	1.363	1.44	1.47	1.497	1.526
-- P&W	3.86	3.982	4.104	4.226	4.348
-- Boeing	1.605	1.642	1.679	1.05	1.085
-- CST	1.617	1.654	1.692	1.729	1.766
-- University of Alabama-Huntsville	0.23	0.237	0.244	0.251	0.259
-- Sverdrup	10.765	12.703	15.621	18.709	20.883
-- Computer Sciences Corp.	0.59	0.61	0.63	0.65	0.67
-- Unspecified Contract Cost	2.69	2.76	2.85	3.3	3.75
-- Federal Data Corporation	32.59	25.08	21.99	13.17	4.33
-- Unspecified Contract Cost	5.71	7.55	9.22	15.96	18.89
-- Federal Data Corporation & Zin Technologies	18.12	19.18	22.65	30.58	34.64
-- Hernandez Engineering	0.54	0.56	0.58	0.6	0.62
-- Science Applications International Corp.	0.135	0.14	0.145	0.15	0.155
-- ASRI	1.35	1.4	1.45	1.5	1.55
-- University Space Research Associates	10.665	12.6	15.515	18.6	20.77
-- Tennessee Valley Authority	0.135	0.14	0.145	0.15	0.155
-- New Contract	4.86	4.9	5.075	5.4	5.58
-- Wyle	10.85	10.73	26.38	29.3	23.1
-- Unspecified Contract Cost	8.837	7.448	9.008	6.577	4.701
-- bd Systems	1.866	0.885	1.602	2.941	3.138
-- Commercial Space Centers	16.829	14.991	14.313	15.685	15.572
total cost of function:	**185.59**	**191.30**	**232.37**	**245.95**	**243.16**

Appendix E: ROM Costs Associated with Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
Functions of JSC/Research Program Office					
- In House Workforce	16	16	15	13	13
- In House Costs	2.24	2.24	2.1	1.82	1.82
- Contract Costs	20.18	19.23	29.13	29.01	29.01
-- Lockheed-Martin (Program/Project Mgmt Support)	20.18	19.23	29.13	29.01	29.01
total cost of function:	**22.42**	**21.47**	**31.23**	**30.83**	**30.83**
Functions of ARC/Research Program Office					
- In House Workforce	32.05	33.4	33.7	42	38.18
- In House Costs	2.49	3.09	3.97	4.50	4.09
- Contract Costs	10.93	14.32	19.61	23.61	23.91
-- Lockheed-Martin (Project Support)	7.28	9.86	13.89	15.02	12.94
-- Dichroma (Resources Support)	0.22	0.23	0.23	0.24	0.25
-- Bionetics (Animal Care Facility)	0.75	0.82	0.95	0.97	1.01
-- Hernandez Engineering (Safety & Mission Assurance)	0.18	0.29	0.39	0.45	0.26
-- Materials (EUE/EGE/Shipping, Facil. Sprt, etc.)	2.50	3.12	4.15	6.93	9.45
total cost of function:	**13.42**	**17.41**	**23.58**	**28.11**	**28.00**

Appendix E: ROM Costs Associated with Current Organization and Content for International Space Station Utilization and Research Program Management

30 January, 2001 Revision

	FY 01	FY 02	FY 03	FY 04	FY 05
Functions of GSFC/Research Program Office					
- In House Workforce					
- In House Costs		*ROM estimate; details not available*			
- Contract Costs					
total cost of function:	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Functions of OSF/Research Program Office					
- In House Workforce	2.0	2.5	3.0	3.0	3.5
-- OSF Payloads	1.0	1.0	1.0	1.0	1.0
-- Engineering Research	1.0	1.5	2.0	2.0	2.5
- In House Costs	0.28	0.35	0.42	0.42	0.49
-- OSF Payloads	0.14	0.14	0.14	0.14	0.14
-- Engineering Research	0.14	0.21	0.28	0.28	0.35
- Contract Costs	0.81	1.11	1.14	1.48	1.48
-- OSF Payloads	0.56	0.84	0.84	0.98	0.98
-- Engineering Research	0.25	0.27	0.3	0.5	0.5
total cost of function:	**1.09**	**1.46**	**1.56**	**1.90**	**1.97**

Appendix F:
Definition of Inherently Governmental Functions

Appendix F: Definition of Inherently Governmental Functions

- **41 U.S.C. § 405, OMB Circular No. A-76**

- **<u>Definition</u>: "A function that is so intimately related to the public interest as to mandate performance by Government employees."**
  - Act of Governing (i.e. discretionary exercise of Government authority)
  - Monetary actions and entitlements

- **<u>Accountability</u>: Executive Branch policy is to ensure Government action is taken as a result of informed, independent judgments made by Government officials who are ultimately accountable to the President.**

Appendix F: Definition of Inherently Governmental Functions, continued

- **<u>Agency Determination</u>: Agency is responsible for determining whether a function is an inherently Government function. Agency decisions may be reviewed and, if necessary, be modified by appropriate OMB officials.**

- **<u>Degree of Reliance/Oversight</u>: The greater the degree of reliance on a contractor, the greater the need for Agency oversight. Agency's decision of the number of Government officials needed for oversight should consider:**
  - Scope of activity in question
  - Technical complexity of the project and its components
  - Technical capability, numbers and workload of Federal oversight officials
  - Inspection techniques available
  - Importance of the activity

Appendix G:
Full Text of Applicable Congressional Legislation and Excerpts from the White House Budget Blueprint

APPROPRIATIONS SIDE

The Act

H.R. 4635, Appropriations Act for NASA for Fiscal Year 2001, and for other purposes. [The Act incorporates H.R. 5482 – the House Bill]

[H.R. 5482, Page 111]
"No funds in this or any other Appropriations Act may be used to finalize an agreement prior to December 1, 2000 between NASA and a non-government organization to conduct research utilization and commercialization activities of the International Space Station."

The Conference Report

Conference Report on H.R. 4635, Department of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2001 [18 October, 2000].

[Page 153-154]
"The conferees do not agree with the Senate requirement for a blueprint plan that identifies lead and complimentary [sic] universities that will coordinate with NASA for science disciplines that will be the focus of research after assembly of the ISS is complete. The conferees direct NASA to submit a plan to the committees on Appropriations of the House and the Senate which includes various ISS management options. The conferees agree that such a plan will give the Congress the information it needs in order to determine what management structure is best and most able to deliver the benefits of the ISS. The Committee on Appropriations will require this information prior to approving funding for any final agreement. Therefore, the conferees have included an administrative provision which prohibits the expenditure of funds prior to December 1, 2001 for finalizing an agreement between NASA and a non-government organization to conduct research utilization and commercialization management activities of the ISS."

AUTHORIZATION SIDE

The Act

H.R. 1654, Authorization Act for NASA for Fiscal Years 2000, 2001, and 2002, and for other purposes.

[Page 1654-14]
"Sec. 205. Space Station Research Utilization and Commercialization Management

(a) Research Utilization and Commercialization Management Activities. – The Administrator of NASA shall enter into an agreement with a non-government organization to conduct research utilization and commercialization management activities of the ISS subsequent to substantial completion as defined in section 202(b)(3). The agreement may not take effect less than 120 days after the implementation plan for the agreement is submitted to the Congress under subsection (b).

(b) Implementation Plan. – Not later than September 30, 2001, the Administrator shall submit to the Committee on Commerce, Science and Transportation of the Senate and the Committee on Science of the House of Representatives an implementation plan to incorporate the use of a non-government organization for the ISS. The implementation plan shall include –

(1) a description of the respective roles and responsibilities of the Administration and the non-government organization;
(2) a proposed structure for the non-government organization;
(3) a statement of the resources required;
(4) a schedule for the transition of responsibilities; and
(5) a statement of the duration of the agreement."

The Conference Report

Report 106-843, Conference Report to accompany H.R. 1654.

[Page 34]
"Section 205. Space station research utilization and commercialization management. The conferees further note that as the ISS approaches full assembly, NASA must begin to focus on establishing an organizational infrastructure capable of ensuring that the ISS is fully and effectively utilized for scientific and engineering research. The conferees commend NASA for initiating a review of management structures by the National Research Council's Space Studies Board and Aeronautics and Space Engineering Board. The national Research Council recommended that a "consortium led by a research institution or group of institutions, governed by an independent board of directors, managed by a strong scientific director, and guided by an advisory process that is broadly representative of the research community" be charged with managing scientific activities aboard ISS. The conferees further note that NASA has had success with utilizing non-government organizations for the operation of major scientific research programs, such as the Hubble Space Telescope. Conferees are also concerned about commercialization opportunities aboard the Space Station. The non-government organization should ensure that equitable opportunities exist for industry to participate in activities. NASA should work with the Department of Commerce's Office of Space Commercialization to ensure that the selected non-government organization has adequate expertise in this area. The conferees therefore direct NASA to enter into an agreement with a non-government organization that will manage the research utilization and commercialization aspects of the ISS. The non-government organization should be selected competitively.

A Blueprint for New Beginnings: Overview of the President's Ten Year Budget Plan

"***International Space Station:*** NASA will undertake reforms and develop a plan to ensure that future Space Station costs will remain within the President's 2002 Budget plan. Key elements of this plan will: restore cost estimating credibility, including an external review to validate cost estimates and requirements and suggest additional options as needed; transfer Space Station program management reporting from the Johnson Space Center in Texas to NASA Headquarters until a new program management plan is developed and approved; and open future Station hardware and service procurements to innovation and cost-saving ideas through competition, including launch services and a Non-Government Organization for Space Station research."

A Blueprint for New Beginnings: Overview of the President's Ten Year Budget Plan, Section 33, page 155, March 2000

Appendix H:
Memorandum of 16 November 1998 (with Attached Reference Model) from the Associate Administrators, Human Exploration and Development of Space Enterprise on "Non-Government Organization for Space Station Utilization".

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of: US

NOV 16 1998

TO: Distribution

FROM: M/Associate Administrator for Space Flight
U/Associate Administrator for Life and Microgravity Sciences and Applications

SUBJECT: Non-Government Organization (NGO) for Space Station Utilization

Ensuring a national return-on-investment from the International Space Station represents an unprecedented challenge in terms of achieving the most effective balance between public and private management. The prospect of employing a NGO to manage the US share of space station utilization and perform payload integration, in close association with an investment trust capable of nurturing private entrepreneurship, offers potential benefits. NASA is firmly committed to pursuit of this potential.

Based on successful experiences with the Space Telescope Science Institute, Jet Propulsion Laboratory and a range of non-government centers, institutes and private consortia, NASA intends to thoroughly evaluate alternative institutional arrangements which can most effectively leverage the specialized talents of government, industry and academia. Toward this objective we are initiating the development and broad review of a reference model for a NGO to meet these purposes. A first draft is enclosed to serve as a point-of-departure for further discussion.

We are requesting you designate, by November 30, 1998, a point-of-contact for your respective organizations to participate in the advancement of this important initiative. The Headquarters lead will be Mr. Mark Uhran. Since this activity represents a key evolutionary component of our overall approach to commercial development of the Space Shuttle fleet and International Space Station,

Mr. Uhran will also assume responsibility for this effort on behalf of the Human Exploration and Development of Space Enterprise.

We ask that you please provide your full support and valuable perspectives to these challenging tasks.

Arnauld E. Nicogossian

Joseph H. Rothenberg

Enclosure

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MSFC/DA01/Mr. Stephenson
SSC/AA00/Mr. Estess

REFERENCE MODEL

A NON-GOVERNMENT ORGANIZATION (NGO) FOR SPACE STATION UTILIZATION MANAGEMENT

Discussion Draft

October 1998

NASA Headquarters Point-of-Contact
Mark Uhran
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"K.E. Tsiolkovsky once wrote: 'The idea, fantasy, or fairy tale invariably comes first. Following this is the stage of scientific investigation. Last comes the crowning achievement of the idea'. From this undoubtedly accurate summarization we need to extract the concept of 'scientific investigation' and examine it more carefully. It is not as easy as it would first appear. Regarding the first step -- the idea, fantasy, or fairy tale – everything is clear. Man has always dreamed of achieving the unattainable (and still does today). Without dreams and the efforts made to attain them progress would be unthinkable. Even if the dream is initially unattainable, this does not mean that it may never be realized. Although harsh reality may intervene repeatedly to prove the impossibility of realizing the dream as yet, reality cannot force people to forget or discard it. Instead the dream is transferred to an original data bank: the fairy tale. There it lives on, continually reminding people of its existence, seeming to await the time when its realization will no longer be impossible.

A more complicated matter is that which Tsiolkovsky called 'scientific investigation.' This stage begins when the general development of scientific knowledge has reached a level of sophistication sufficient to allow someone to appear who is able to envision a way of realizing the dream (very often it is several people who live far apart and who work independently of one another). During this stage the dream begins to move towards reality, but it does not go beyond the discovery that what everyone has heretofore considered an unattainable -- and therefore empty -- dream is in fact possible after all."

from Herman Oberth: The Father of Space Flight
Boris V. Rauschenbach, 1994

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The purpose of this reference model is to initiate a discussion of a new management approach to R&D in low-earth orbit consistent with the present and future constrained budget challenges. The objective is to create a non-government organization (NGO) for accomplishing an aggressive science, technology and commercial development program while simultaneously limiting government functions to policy and oversight.

The ultimate success of the orbital R&D program depends equally on the efficient operation of the space and ground assets (laboratories, spacecraft, space station...) and on the optimal utilization of the assets by the R&D community. The utilization component must be managed in a manner which ensures productivity of the space station and other future ground and space assets.

The framework for a NGO should be based on a management structure that is representative of, and responsive to, a broad base within the utilization community. This management structure must possess a high degree of stability that will permit it to undertake and complete an integrated program over the expected life of the space station and associated assets.

VISION

- A dedicated NGO that will develop the low Earth orbit environment for all users (scientific, technological, and commercial), in order to advance scientific knowledge, technological capability, and commerce on Earth as a gateway to 21st Century exploration and development of space.

GOALS

1. Complete an operational concept and establish a NGO in the United States by FY 2000.
2. Employ the NGO to revolutionize the approach to research, exploration and development of space through increased academic cooperation and industrial collaboration.
3. Offer to expand the initial organization to accommodate international aspects in conjunction with completion of the International Space Station.

PRINCIPAL PURPOSES

1. Engage the science community in a cooperative endeavor to aggressively expand the scientific foundation for human exploration and development of space.
2. Engage the engineering community in a collaborative endeavor to aggressively expand the technological capability of the International Space Station and enable future human exploration and development of space.
3. Disperse information on the resulting scientific and technological achievements for the benefit of life on Earth, while stimulating the commercial community to expand the global economy in space products and services.

WORKING PRINCIPLES

(a) **Scope of R&D Program Management**

- The scope could include all R&D projects which utilize a US share of the International Space Station.
- Collaborating and supporting research using other NASA ground, air, and space assets could be included by written agreement.
- Basic and applied, flight and ground, research in science and technology could be pursued with strategic direction in selected areas such as, but not limited to:
  - biology, chemistry and physics
  - medical research and applications
  - environmental sciences and life support technologies
  - spacecraft system, subsystem and component engineering
  - space processing of materials
  - biotechnology
  - remote sensing
  - communications

- The scientific research program could be managed by the NGO and the research projects could be conducted by distributed laboratories, institutes, and research and development facilities in the academic, industrial, and government sectors.

- The technology development program could be managed by the NGO and the development projects could be conducted by distributed laboratories, institutes, and research and development facilities in the academic, industrial, and government sectors.

(b) **Scope of Commercial Program Development**

- Proof-of-concept or full-scale private commercial projects could be administered by the NGO in accordance with national policy.
- The policy could include specific provisions to address totally subsidized, partially subsidized, and non-subsidized entrepreneurial endeavors.
- A value-based pricing schedule could be established during the early operations period, with a transition to cost recovery when commercial enterprises become profitable.

- In the event recovery of public operating costs prohibits profitable operations, or the supply of station accommodations is exhausted, commercial enterprises could relocate to privately owned and operated space platforms.

(c) **Role in Space Exploration**

- The NGO could undertake R&D projects, sponsored by NASA, with applications to the human exploration and development of space enterprise.

(d) **Program and Project Funding**

- Funds could be provided by both public and private sources.
- Public sources could include government agencies which serve as catalysts, such as, but not limited to, NASA.
- Private sources could include philanthropies, industrial organizations, university/industrial consortia, financial institutions, and venture capitalists.
- A privately managed space trust corporation could be created to operate in close association with the NGO, in order to assist in the evaluation and financing of entrepreneurial ventures.

(e) **Program and Project Opportunities**

- Scientific and technological R&D opportunities, which are funded through public monies could be announced on a regular periodic basis and could be open to competition among academic, industrial and government scientists and engineers world-wide.
- Commercial opportunities could be open on a continuous basis for proposals by private organizations.
- Since the magnitude of opportunity will be constrained by available station resources and accommodations, an allocation policy could be established by the NGO Board of Directors.

(f) **Program Integrity and Project Selection**

Scientific Research:

- Projects could be externally peer reviewed to the highest standards and rated, prior to selection by the NGO Science Program Office based on scientific merit.
- The selections could conform to the programmatic objectives and funding levels of the respective sponsors.

Technology Development:

- Projects could be internally reviewed by the NGO Technology Program Office and selected based on engineering feasibility.
- The selections could conform to the programmatic objectives and funding levels of the respective sponsors.

Commercial Ventures:

- Projects could be administered by bonded personnel in the NGO Commercial Program Office.
- Selection criteria could vary with the level of public subsidization.
- Non-subsidized ventures could be selected on the basis of the magnitude of private capital at risk; partially subsidized ventures could be rated by the ratio of private-to-public funding, and; fully subsidized ventures could be selected at the discretion of the government sponsor.
- The NGO could be required by the Board of Dirctors to administer a portfolio with minimum shares in each of these categories.

(g) Notification of Project Awards

- The NGO could issue formal notifications of award, subject to the principles on program integrity and project selection.
- In cases of commercial ventures, with private funding, notifications could be confidential by prior request.

(h) Distribution of R&D Project Awards

- Funds could be allocated for award to both NGO-resident (e.g., 10%) and non-resident (e.g., 90%) scientists and engineers on a competitive basis.

Open Item: do the advantages associated with some degree of resident R&D outweigh the disadvantages?

Advantages include:

(1) the ability to attract a high-quality, professionally recognized science and engineering staff;

(2) the ability of the resident NGO staff to work at a peer level with the non-resident R&D community and to serve a "smart buyers";

(3) the increased professional credibility of the NGO; and

(4) the incentive created by broadening the NGO's scope of operations to include resident R&D.

Disadvantages include:

(l) the potential appearance, or actual existence, of a conflict of interest in the resident and non-resident R&D award process.

(i) **R&D Results**

Proprietary Results:

- All R&D results and information could be the property of the funding source and handled without public disclosure, as addressed through binding agreement among the parties.

Non-Proprietary Results:

- All research results could be treated as within the public domain.
- Every research project awarded could be required to conform to the data policy of the funding source.
- All reports could be archived at the NGO and available on-line through international telecommunications networks.

(j) **Resident Staff**

- Resident staff could be representative of the core science and engineering disciplines with visiting senior scientists and engineers in selected specialties.
- All visiting staff could be fully authorized to make decisions and enter into agreements on the behalf of their home institutions.
- Options for a government presence could include a liaison office limited to on-site representatives of the program sponsors, or visiting Senior Scientists and Engineers.

(k) **Project Scientists and Project Engineers**

- Every R&D project could include the designation of a resident NGO staff member as Project Scientist or Project Engineer.
- The role of the NGO Project Scientists and Engineers could be to assist non-resident flight research projects through the steps associated with physical, analytical, and operations integration of flight research projects.

(l) **Research Facilities**

- The NGO could be based in a physical facility (public or private) with either on-site, or geographically dispersed, laboratory assets, or both.
- It could employ state-of-the-art international telecommunications networks for communications with associated organizations from either the public or private sectors.

(m) **Laboratory Assets**

- Existing government assets could be transferred to the NGO for management or made available through negotiated agreement.
- These assets could include both space and ground-based facilities.
- Development of new assets, including flight instruments and facilities, could be performed by the NGO or placed under NGO management.

(n) **Payload Physical, Analytical, & Operations Integration**

- Functions could be performed by the NGO, or a mission support contractor to the NGO.
- Orbital real-time operations replanning could be performed by the space station operator in cooperation with a Mission Director and R&D Working Group assigned by the NGO.
- The NGO could perform all tactical planning for R&D operations on flight and ground systems.

(o) **Organizational Interfaces**

- The NGO could interface with public and private funding sources for space station related policy, oversight and strategic direction;
- with the space station operator (public or private) for payload accommodations and system operations integration;
- with world-wide academic, industrial and government organizations for space station R&D project performance;
- with private organizations for commercial ventures, and;
- with an external advisory committee for independent annual review.

(p) **Instruments of Agreement**

- Agreements between the NGO and associated organizations could be established through a variety of instruments and would be limited only by public law.
- These instruments could be tailored on a case-by-case basis to best protect the interests of the parties.
- The instruments could include, but would not be limited to:

  - memoranda of agreement
  - terms of reference
  - contracts
  - grants
  - joint endeavor agreements
  - memoranda of understanding
  - cooperative R & D agreements
  - space system development agreements
  - industrial guest investigator agreements
  - intergovernmental personnel agreements

(q) **Program Planning**

- The NGO could develop projections of available orbital accommodations and resources based on information supplied by the space station operator.
- The NGO could formulate options for accommodating research requirements, maintain a dynamic Mission Model, and produce an annual one-year R&D Program Plan and an annual one-year Commercial Prospectus.
- The Plan and Prospectus could be reviewed and approved by the NGO Board of Directors at an annual meeting.
- The annual Plan and Prospectus could be formulated within the broader context of the funding sponsors' long-term strategic plans and commitments.

(r) **Board of Directors**

- The NGO board could include academic, industrial, and government directors.
- Voting shares on the board could correspond to annual funding commitments of the sponsoring directors.
- The Board could ensure the NGO operates in accordance with its charter and within the policy established by the sponsoring directors.

(s) **Accountability**

- The NGO could produce quarterly reports on cost, schedule and performance status for every active R&D project and an annual report on achievements for every active R&D program.
- All reporting could be subject to proprietary information restrictions.
- The quarterly and annual reports could be the primary products delivered to the funding sponsors (e.g., NASA, or other public and private program sponsors).

(t) **Advisory Committees**

- An independent external advisory committee could perform periodic independent reviews of NGO progress and achievements.
- In the case of the United States, independent advice and guidance could also be provided by the standing boards and committees of the National Research Council.
- The NASA Advisory Council, and its standing committees and subcommittees, could perform periodic reviews at the request of the NASA program sponsoring offices.

(u) **Educational Responsibilities**

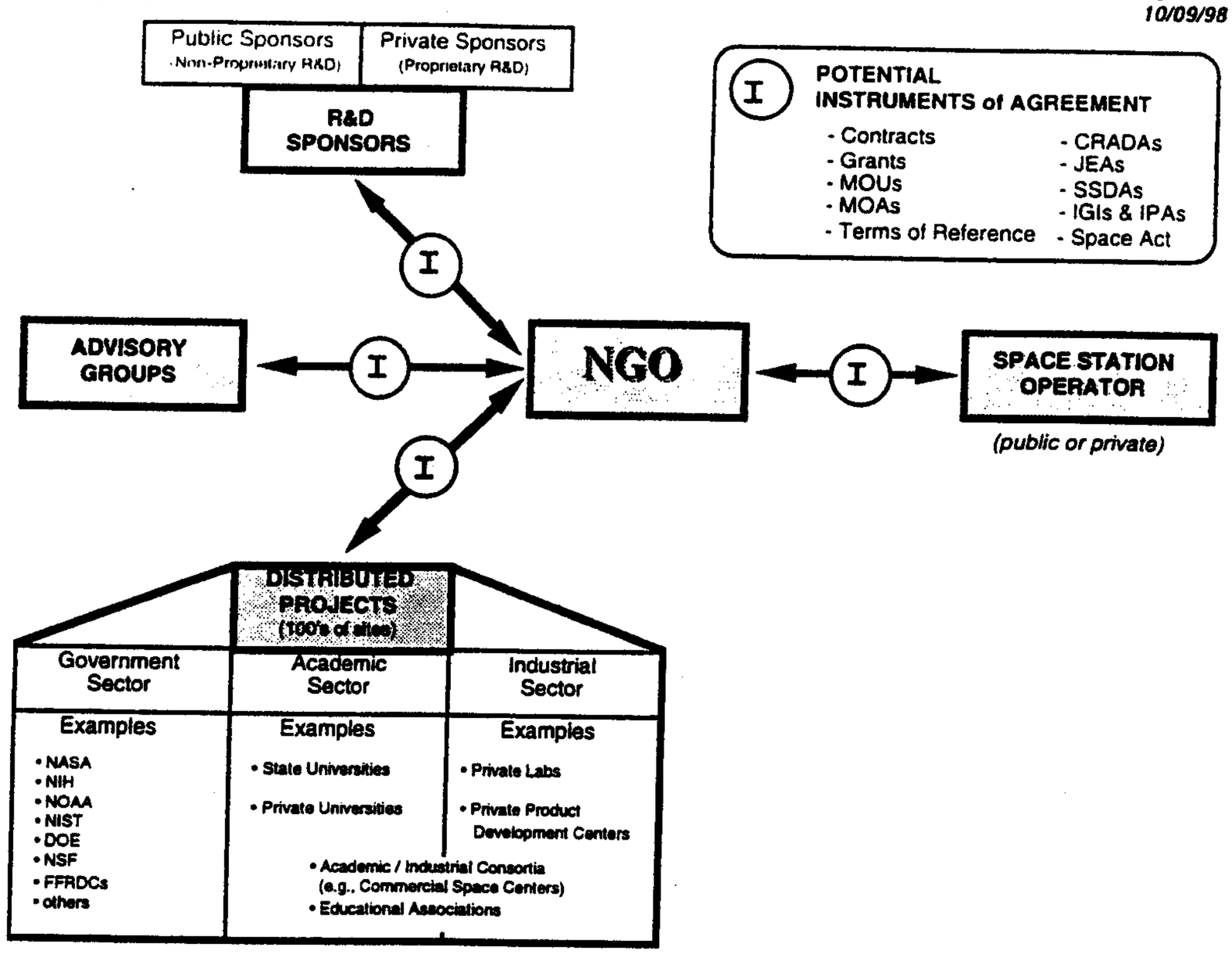
- The NGO could include a dedicated Education Office with responsibility for communicating the beneficial attributes of the orbital environment and the progress of the R&D program to public and private audiences at all levels in the academic, government and industrial sectors.
- The costs associated with this function could be funded by the space station owners and operators.

(v) **Criteria for Institute Site Selection**

- Criteria could include,
  - availability of existing facilities and skilled personnel;
  - geographic attractiveness for personnel relocation;
  - easy access for program sponsors and project managers;
  - potential for evolution to international operations;
  - association with an internationally recognized university;
  - support of the local and state governments; and
  - proximity to advanced telecommunications resources.

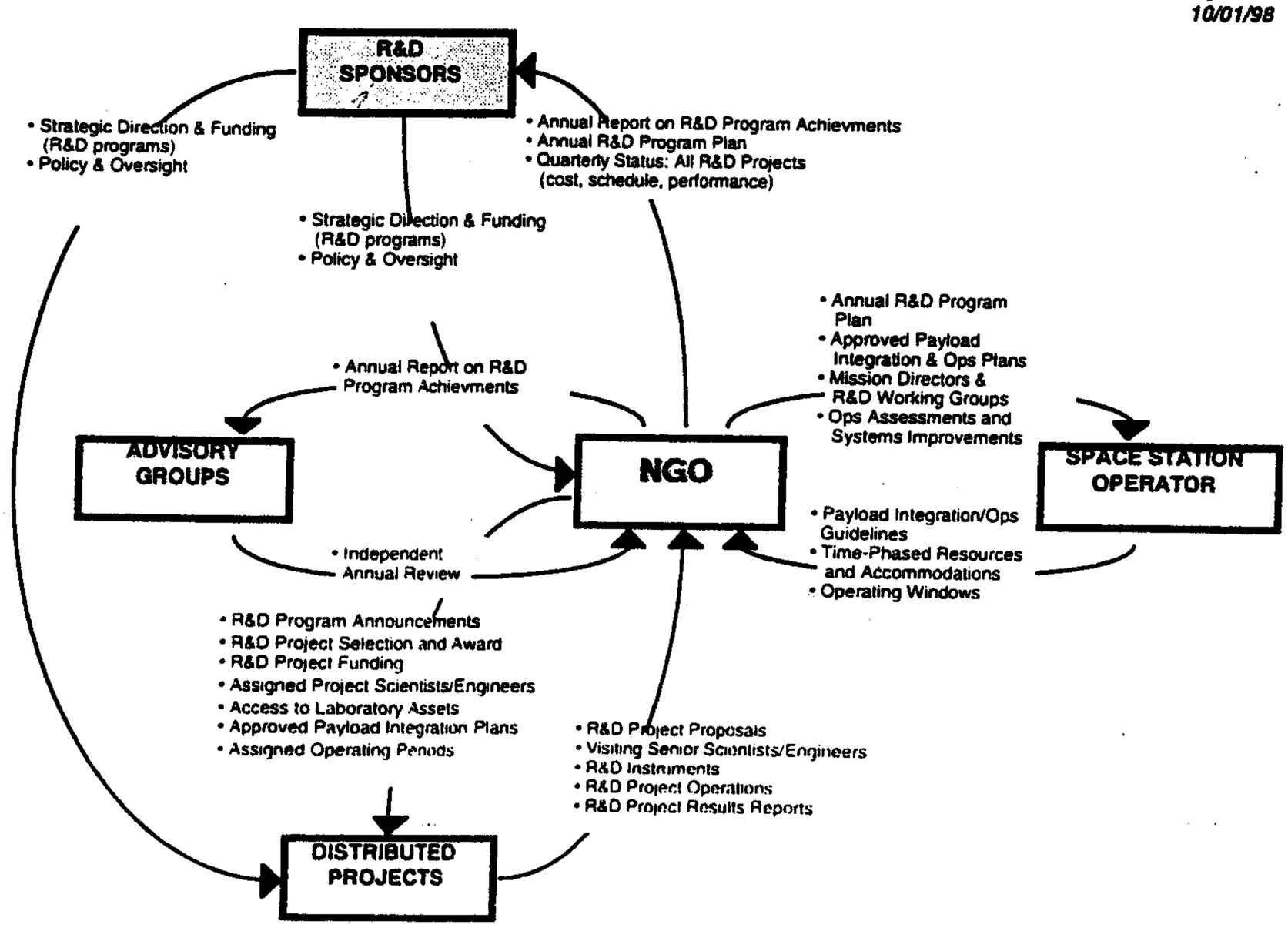
TERMINOLOGY

Working Draft
10/09/98



TRANSACTIONS

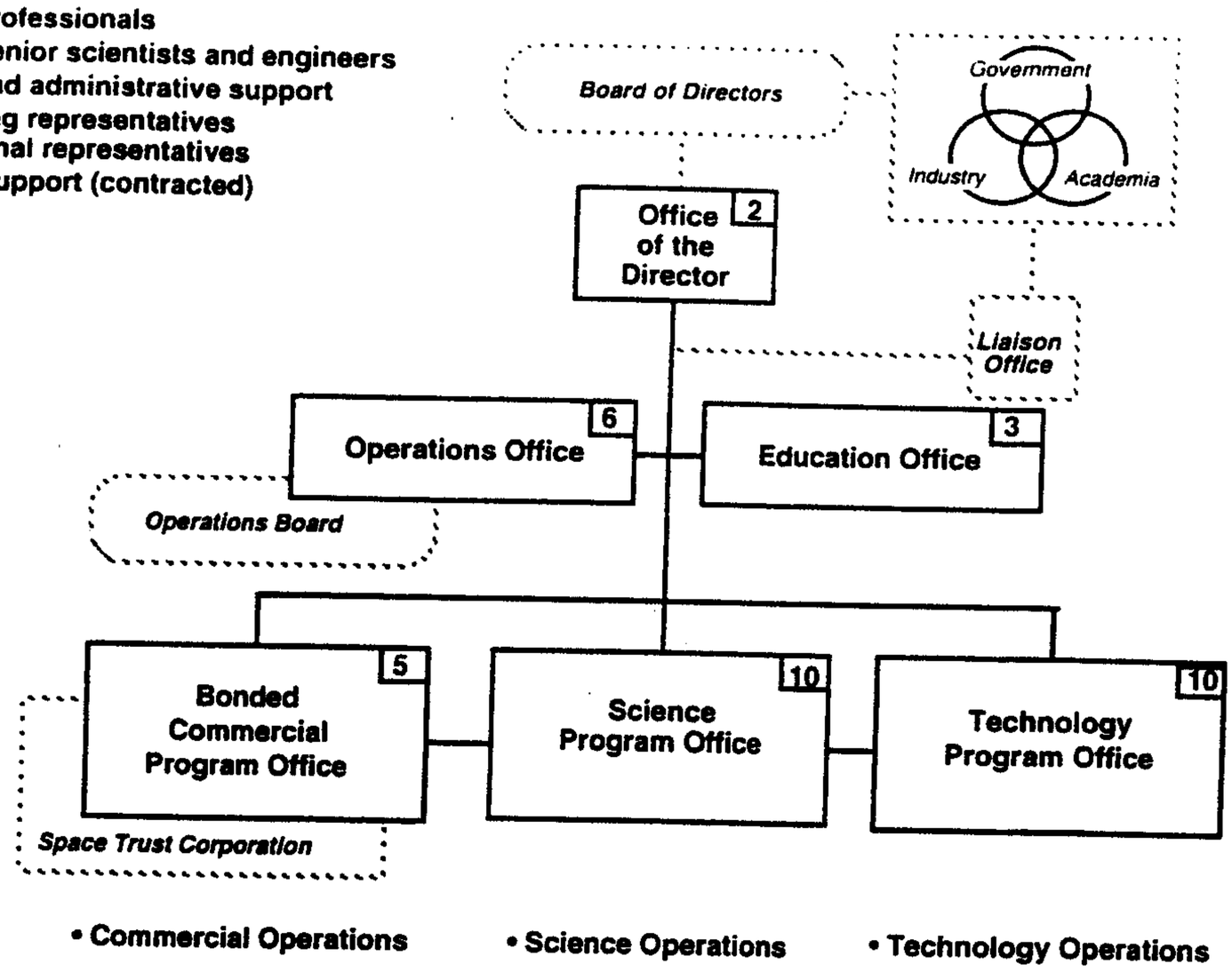
Working Draft
10/01/98



ORGANIZATION

Working Draft
10/09/98

36 Resident Professionals
+ visiting senior scientists and engineers
+ clerical and administrative support
+ sponsoring representatives
+ international representatives
+ mission support (contracted)



FUNCTIONS

Working Draft
10/09/98

Office of the Director
- selected by the Board of Directors
- utilization program development
- management and administration

Board of Directors
- annually reviews & extends research programs
- communicates policies of the sponsoring organizations
- approves Annual R&D Program Plan and Commercial Prospectus

Liason Office
- staffed by national and international program sponsors
- represents sponsors and provides oversight

Education Office
- develops collateral products for education
- communicates attributes of orbital environment and achievements of the R&D programs

Operations Office
- strategic, tactical, and contingency planning
- manages resource allocations & mission model
- manages mission support contract
- produces annual R&D Program Plan and annual Commercial Prospectus

Operations Board
- selects Project Scientists & Engineers for residency
- approves visiting Senior Scientists & Engineers
- assigns Mission Directors and R&D Working Groups
- approves payload integration plans & flight assignments
- assigns operating periods & accommodation sites

Science Program Office
- scientific research program management
- conducts nominal share of scientific research
- establishes science project queue
- defines requirements for flight instruments
- procures/develops flight instruments
- manages analytical, physical and operations integration
- manages science results archive

Technology Program Office
- technology development program management
- conducts nominal share of technology development
- establishes technology project queue
- defines requirements for flight equipment
- procures/develops flight equipment
- manages analytical, physical and operations integration
- manages technological results archive

Bonded Commercial Program Office:
- implements commercial policy of government sponsors
- liaisons to private sector and Commercial Space Center network
- establishes commercial project queue
- manages analytical, physical and operations integration
- maintains proprietary procedures and protocols

Space Trust Corporation
- manages private capital funds
- selects private ventures for funding with equivalent rigor to private capital markets
- finances qualified private ventures, if necessary

RESPONSIBILITIES

Working Draft
10/09/98

NASA

Headquarters

STRATEGIC NASA R&D PROGRAM PLANNING:
- Strategic direction and funding of R&D programs.
- Policy formulation.
- Oversight of NGO.

Field Centers

R&D PROJECT MANAGEMENT
- specific NASA projects

DEVELOPMENT
- Manage and conduct design, development, test, and evaluation of advanced spacecraft system projects for NASA Enterprises.
- Manage and conduct design, development, test, and evaluation of current space station payload facility class hardware, through to completion and on-orbit test and verification.

OPERATIONS & MAINTENANCE (potential GO-CO elements)
- Manage safe operation and maintenance Space Shuttle and International Space Station.
- Manage safe operation and maintenance of government ground-based laboratories, control centers, and facilities.

HUMAN RESOURCES (potential GO-CO elements)
- Maintain occupational safety and health of flight crews and ground personnel.
- Manage & conduct training of flight crews and ground personnel.

NGO

STRATEGIC SPACE STATION UTILIZATION PLANNING
- Strategic utilization planning for science, technology and commercial programs/projects.
- National & International collaboration and coordination for scientific research and technology development programs.
- Integration of station-wide utilization requirements.
- Definition and assignment of orbital operating periods to R&D projects.
- Mission modeling, resource allocation, and bartering.
- Utilization advocacy and education.

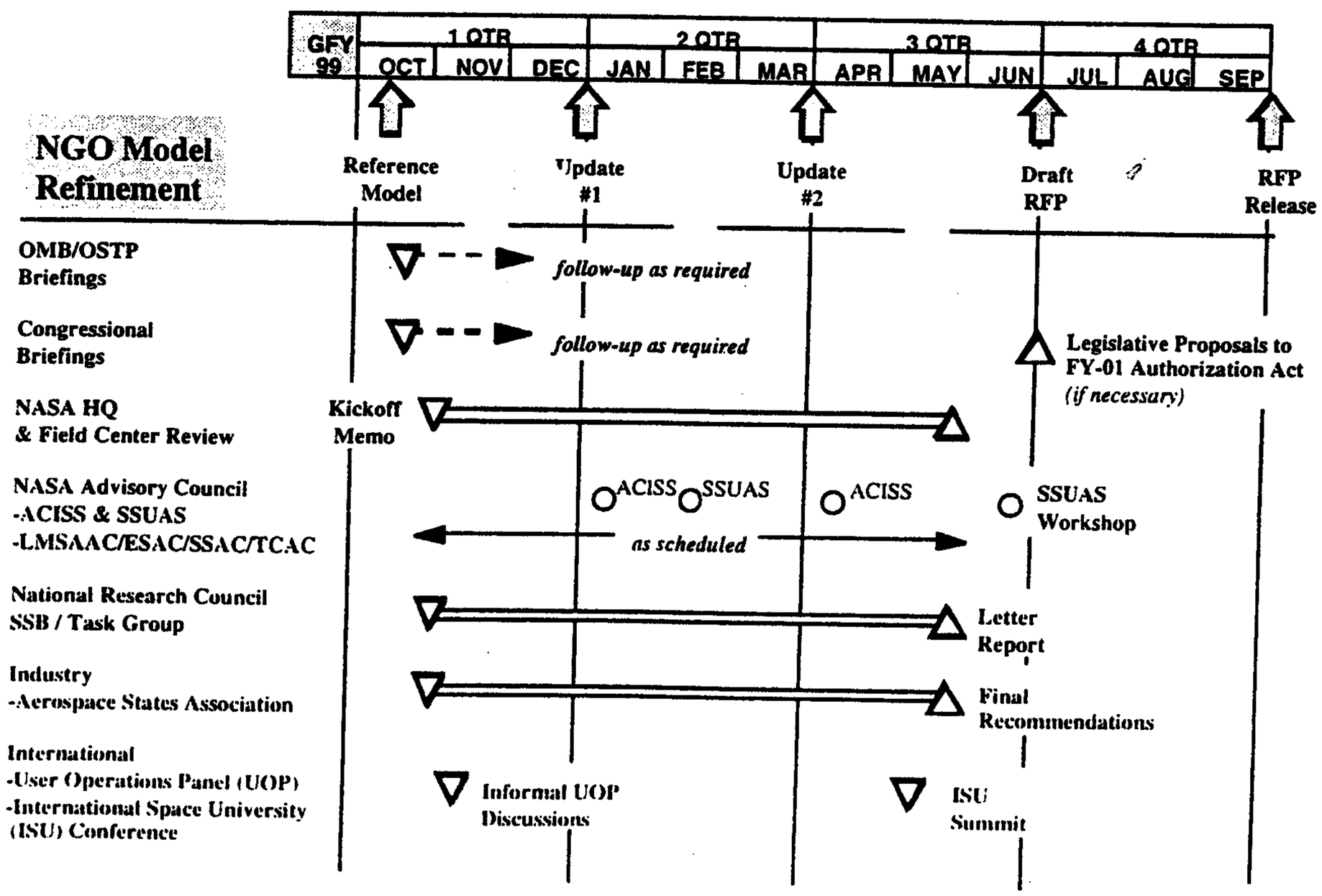
SPACE STATION UTILIZATION PROGRAM MANAGEMENT
- station-wide management integration for US programs.
- US interface to international partner utilizationprograms for mission integration.

DEVELOPMENT
- Manage development of requirements and specifications for next generation government sponsored payload hardware.
- Manage design, development, test and evaluation of future government sponsored payload elements.
- Develop recommendations for flight/ground system improvements.

OPERATIONS & MAINTENANCE
- Manage payload flight / ground systems operations & maintenance.
- Manage payload analytical, physical and operations integration.
- Represent US interests in international forums and provide Mission Director(s) and R&D Working Groups.
- Develop requirements for payload crew skills and qualifications.
- Manage payload data processing, data distribution, and results archiving.

STAKEHOLDER VETTING

Working Draft
10/09/98



DRAFT

DRAFT

Concept Development Review with Center Directors

Non-Government Organization (NGO) to Manage International Space Station Utilization

9 - 10 March, 2000

Contents:

- Objectives
- Actions Completed in CY-99
- An Approach to Detailed NGO Definition

HQ POC : Mark Uhran
MSFC POC : Irene Taylor
JSC POC : Jessica Kite
[illegible] POC : [illegible]

NASA Objectives *

- To facilitate the pursuit of flight research and make the complex operating environment associated with the International Space Station transparent to the end-user.

- To reduce the end-to-end cycle time associated with the announcement, selection, development, flight, and achievement of results for research and development endeavors on the International Space Station.

- To increase the long-range productivity of research and development by most effectively integrating and advocating government and industry utilization of the International Space Station.

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* It is not envisioned that a NGO would manage the research; but that it could integrate and most efficiently plan for broad-based utilization. Management of the research programs would remain as present.

Actions Completed in CY-99

- At NASA request, The National Research Council formed a *Task Group on Institutional Arrangements for Space Station Research* and delivered report in December 1999.
  - Report generally supports NGO concept and clears path for further definition by NASA.
  - Many recommendations are well beyond the NASA objectives.
  - No obligation to NASA to embrace every NRC recommendation in full.

- In parallel with NRC work, a trade study on *Options for Managing Space Station Utilization* was undertaken to objectively identify alternative NGO architectures.
  - Competitive procurement of a direct contract involving a consortium appears to be the most tested and historically effective option, if we proceed.
  - <u>Considerable work remains</u> to clearly establish the scope of functionality, organizational interfaces, transition schedule and budget.

- No changes to current baseline are anticipated until the scope of functionality,organizational interfaces, transition schedule and budget are fully defined and understood by all affected parties.

An Approach to Detailed NGO Definition

- **Functional Definition Team**
  - Establish multicenter core team to produce detailed definitions of utilization program functions.
  - Employ components of existing budgets as points-of-reference.

- **Functional Allocation Options**
  - Expand core team to develop series of options, with supporting rationale, which allocate functions to specific organizations:
    - -- headquarters offices (codes M, S, U, Y);
    - -- center offices (JSC, MSFC, KSC, ARC, GRC, JPL); and
    - -- representatives of science working groups on an advisory basis.
  - Develop criteria to evaluate options.

- **Validation and Review Cycle**
  - Review functional definitions, allocation options, proposed implementation schedules and budget plans with senior management.
  - Go / no go decision by Associate Administrators for Human Exploration and Development of Space Enterprise.
  - Following resolution of issues and internal agreement, review with:
    - -- internal stakeholders (NASA Science Council), and
    - -- external stakeholders (OMB, OSTP, Congressional Staff, NASA Advisory Council).

Schedule

Target	
3/15	Brief headquarters and center senior management.
3/30	Identify multicenter functional definition team.
5/30	Complete functional definitions.
8/30	Complete functional allocation options w/associated interfaces, implementation schedules and budget plans.
9/30	Review w/headquarters and center senior management.
10/15	HEDS Enterprise Go/No-Go decision Review w/internal and external stakeholders.
10/30	Draft SOW and acquisition strategy meeting.
12/30	Final SOW and RFP.
1/30	RFP release in conjunction w/US lab launch.
3/30	Proposals due.
5/30	Evaluations complete.

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of:

M

MAY 23 2000

TO: Distribution

FROM: M/Associate Administrator for Space Flight
U/Associate Administrator for Life and Microgravity Sciences and Applications

SUBJECT: Clarifications Regarding Studies Related to International Space Station (ISS) Utilization and Operations

During meetings conducted March 9-10, 2000, at the Marshall Space Flight Center (MSFC) and Johnson Space Center (JSC) on the subject of a potential "Non-Government Organization (NGO) to Manage International Space Station Utilization," several questions were raised regarding the relationship and scope of follow-on studies. The purpose of this memorandum is to provide clarification regarding future efforts in this area.

There are no preconceived conclusions with respect to the structure of such a contractual organization. In response to the recent report of the National Research Council task group on "Alternative Institutional Arrangements for Space Station Research," the intent is to form a team to develop detailed definitions of the specific functions currently associated with ISS utilization and the attendant research. These definitions will be valuable regardless of whether the Agency proceeds with a contract relationship for ISS utilization management and should be developed with disregard to such an outcome. This team will include: Ms. Irene Taylor, MSFC; Ms. Jessica Kite, JSC; Ms. Maynette Smith, KSC; and, Mr. Mark Uhran, NASA Headquarters.

Following the functional definition phase, the team will brief NASA Headquarters and center senior management on the results before proceeding with further work. If the management team elects to proceed, the study team will be expanded appropriately and charged to develop an option(s), with supporting rationale, which addresses potential contract relationships for ISS utilization management. This will also be reviewed with the management team prior to any procurement decisions.

A common understanding of the objectives, a thorough evaluation of the alternatives, and the engagement of all affected parties will be essential in the decision making process.

To this end, NASA candidate objectives for a potential contractual relationship include:

1. To facilitate the pursuit of flight research and make the complex operating environment associated with the ISS transparent to the end-user;
2. To reduce the end-to-end cycle time associated with the announcement, selection, development, flight and reporting of results for research and development (R&D) efforts on the ISS; and;
3. To increase the long-range productivity of R&D by most effectively integrating and advocating government and industry utilization of the ISS.

Efforts already underway within NASA which relate to these objectives are to be taken into full consideration. The recent international Payload Safety Conference, and any pursuant actions, represents an example. If it is determined that such activities are already achieving significant progress toward the stated objectives, further actions may not be required.

As a result of this effort, and in anticipation of next year's launch of the ISS United States Laboratory *Destiny*, considerable attention is turning toward the details of the payload integration process. It is expected that a number of previously established internal and external reviews will also explore this subject in some depth. In order to reduce workload impacts, the Space Station Program Office is requested to develop a comprehensive briefing which benchmarks the end-to-end payload integration process for use with multiple audiences.

In addition to the internal study on ISS utilization management, a reassessment of the approach to ISS system operations and maintenance (O&M) is being performed. This external "ISS Operations Architecture Study," led by Dr. John Cox, is examining the potential for improvements to ISS O&M in the coming era. Since O&M is intrinsically linked to utilization, the team has also been tasked to consider how the two functions would interface most effectively.

The internal and external studies are complementary by design and will position our management team to make the critical architectural decisions necessary as we expand space station operations in the months to come and begin ISS utilization.

If there are any questions regarding these activities and their necessary interrelationships please contact me.

Joseph H. Rothenberg

Arnauld E. Nicogossian, M.D.

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